МІНІСТЕРСТВО ОСВІТИ ТА НАУКИ УКРАЇНИ

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SCIENCE LOOKS AHEAD

Наука – погляд у майбутнє

Матеріали
міжвузівської студентської наукової конференції

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Матеріали охоплюють широке коло питань з новітніх досягнень в різних галузях науки й техніки. Матеріали публікуються англійською мовою.

Призначено для студентів, магістрів та аспірантів технічних ВНЗ.

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ENGLISH SECTION

CCTV IN THE CLOUD

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CCTV in the Cloud – Oxymoron or paradigm shift? The CLOUD... what is it? The CLOUD: a foggy concept More of marketing buzzwords than well defined technologies People have different ideas on the meaning of these terms in video surveillance the term CLOUD have been too often abused.

Advantages of a CLOUD based infrastructure: No need of in-house computing infrastructure; No need of skilled staff for installation, maintenance and troubleshooting; Reliability.

The provider takes care of Redundancy, Contuinuity of operations, Backups and Disaster recovery. Costs scalability of a CLOUD based architecture: No initial investment; Predictable costs; Pay only what you use / need; Grow or shrink computing power, storage and bandwidth on demand.

Geography independent Unlimited tenants Accessibility of Cloud Architectures. Ever growing number of cameras Human surveillance is not affordable or feasible. A real waste of resources Interesting events are just a tiny part of the recorded video. Data generated by video surveillance has grown to practically unmanageable amounts.

Real life case: July 2005 London bombings. The recordings were examined for weeks by human operators trying to find a clue in the thousands and thousands hours of footage. Weeks of recordings of hundredths diverse CCTV systems where collected from diverse sources: city center control, shops, banks, etc.

Common misconceptions CLOUD is not just remote storage or accessing applications via web browser. Why cloud storage of video is not viable? Sheer size of produced data Costs of storage and transfer Limited available bandwidth.

Moving mountains around, extremely rare, just like a speck of gold lost in tons of rock Miners don't move mountains of rock around! They bring mining equipment close to where gold ore is dug Meaningful images are. So, what now?! Dealing with Big Data, Cannot rely on significantly more efficient image compression algorithms, Must rely on edge-side storage of high quality HD video, Must use video content analysis (VCA) to filter important footage out (thumbnails or short clips), Describe meaningful events by means of effectively searchable metadata.

Extracting interesting information on site Understand locally and communicate only if needed Smart cameras can filter out significant events to reduce the quantity of data streamed to the data center even with limited bandwidth. Available features: Blob Motion Tracking, Tracking & Trajectory, Smoke detection, Fire detection, Face detection, Crowd detection, Alarm Panic Detection etc.

Accurate image analysis: now possible since it is made on RAW images coming from the sensor Smart Products Internal Architecture Local high resolution storage and external streaming with adaptive bandwidth. Broadband connection not required Bidirectional communication layer, encrypted and automatic. Secure and reliable Internet connectivity Virtualized data centre software with Private or Public Cloud deployment. The control room is everywhere an Internet connection is available

Similar problem: the search for Higgs boson CERN – LHC accelerator; Bunches of protons and antiprotons crossing 40 million times per second generate about 20 collisions per crossing totaling about 1 billion collisions per second. The correct approach – Normalize and correlate information from heterogeneous sources to extract meaningful and actionable results and Merge information from widely distributed different providers and organizations.

The investments and the time needed to achieve the described scenario are certainly very large. It is important, then, to devise effective ways to normalize, merge and analyze data coming from existing systems preserving most of the prior investments.

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THE FIRST "SOCIAL NETWORK" OF BRAINS

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The ability to send thoughts directly to another person's brain is the stuff of science fiction. At least, it used to be.

In recent years, physicists and neuroscientists have developed an armory of tools that can sense certain kinds of thoughts and transmit information about them into other brains. That has made brain-to-brain communication a reality. These tools include electroencephalograms (EEGs) that record electrical activity in the brain and transcranial magnetic stimulation (TMS), which can transmit information into the brain.

In 2015, Andrea Stocco and his colleagues at the University of Washington in Seattle used this gear to connect two people via a brain-to-brain interface. The people then played a 20 questions–type game.

An obvious next step is to allow several people to join such a conversation, and today Stocco and his colleagues announced they have achieved this using a world-first brain-to-brain network. The network, which they call BrainNet, allows a small group to play a collaborative Tetris-like game. "Our results raise the possibility of future brain-to-brain interfaces that enable cooperative problem-solving by humans using a 'social network' of connected brains," they say.

The technology behind the network is relatively straightforward. EEGs measure the electrical activity of the brain. They consist of a number of electrodes placed on the skull that can pick up electrical activity in the brain.

A key idea is that people can change the signals their brain produces relatively easily. For example, brain signals can easily become entrained with external ones. So watching a light flashing at 15 hertz causes the brain to emit a strong electrical signal at the same frequency. Switching attention to a light flashing at 17 Hz changes the frequency of the brain signal in a way an EEG can spot relatively easily.

TMS manipulates brain activity by inducing electrical activity in specific brain areas. For example, a magnetic pulse focused onto the occipital cortex triggers the sensation of seeing a flash of light, known as a phosphene.

Together, these devices make it possible to send and receive signals directly to and from the brain. But nobody has created a network that allows group communication. Until now.

Stocco and his colleagues have created a network that allows three individuals to send and receive information directly to their brains. They say the network is easily scalable and limited only by the availability of EEG and TMS devices.

The proof-of-principle network connects three people: two senders and one person able to receive and transmit, all in separate rooms and unable to communicate conventionally. The group together has to solve a Tetris-like game in which a falling block has to be rotated so that it fits into a space at the bottom of the screen.

The two senders, wearing EEGs, can both see the full screen. The game is designed so the shape of the descending block fits in the bottom row either if it is rotated by 180 degrees or if it is not rotated. The senders have to decide which and broadcast the information to the third member of the group.

To do this, they vary the signal their brains produce. If the EEG picks up a 15 Hz signal from their brains, it moves a cursor toward the right-hand side of the screen. When the cursor reaches the right-hand side, the device sends a signal to the receiver to rotate the block.

The senders can control their brain signals by staring at LEDs on either side of the screen – one flashing at 15 Hz and the other at 17 Hz.

The receiver, attached to an EEG and a TMS, has a different task. The receiver can see only the top half of the Tetris screen, and so can see the block but not how it should be rotated. However, the receiver receives signals via the TMS from each sender, saying either “rotate” or “do not rotate.”

The signals consist of a single phosphene to indicate the block must be rotated or no flash of light to indicate that it should not be rotated. So the data rate is low—just one bit per interaction.

Having received data from both senders, the receiver performs the action. But crucially, the game allows for another round of interaction.

The senders can see the block falling and so can determine whether the receiver has made the right call and transmit the next course of action – either rotate or not – in another round of communication.

This allows the researchers to have some fun. In some of the trials they deliberately change the information from one sender to see if the receiver can determine whether to ignore it. That introduces an element of error often reflected in real social situations.

But the question they investigate is whether humans can work out what to do when the data rates are so low. It turns out humans, being social animals, can distinguish between the correct and false information using the brain-to-brain protocol alone.

That's interesting work that paves the way for more complex networks. The team says the information travels across a bespoke network set up between three rooms in their labs. However, there is no reason why the network cannot be extended to the Internet, allowing participants around the world to collaborate.

"A cloud-based brain-to-brain interface server could direct information transmission between any set of devices on the brain-to-brain interface network and make it globally operable through the Internet, thereby allowing cloud-based interactions between brains on a global scale," Stocco and his colleagues say. "The pursuit of such brain-to-brain interfaces has the potential to not only open new frontiers in human communication and collaboration but also provide us with a deeper understanding of the human brain."

BIOHACKING AND NOOTROPICS

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Biohacking is a contemporary unknown word which everyone has to discover. There are a lot of definitions of it, but I am willing to point the main one. Biohacking is a complex of different methods whose goal is to increase human's natural abilities using

non-standard sport activities, psychological trainings and a big variety of methods. So my aim is to characterize one of them named nootropics.

Nowadays every student is stressed by an enormous amount of information which is needful in everyday education. And it continues growing every year with refreshing of coursebooks and educational programs. So it is very important to use your brain opportunities fully to keep the level of knowledge and raise it every day. Nootropics give this opportunity to every human. That is why nootropics as smart drugs have become popular not only in the students' world but in scientific one.

How do they work?

Not long ago the main problem of using the smart drugs was the lack of research and different issues with interpreting the results, which were changing from the smallest up to magnificent. Today we have enough statistics to make a conclusion about abilities and activity of nootropics.

Commonly, nootropics target neurotransmitter systems in the brain and their specific receptors to stimulate nerve growth or alter the availability of the brain's oxygen supply, and in doing so are thought to increase the cognitive efficiency of brain functions. The effectiveness of nootropics is very specific and depends on an individual's neurochemistry and lifestyle. Also they have better results in a course of treatment.

So, this information shows that today we have real drugs which you can buy in every pharmacy in Ukraine. The latest modifications of those give striking results and help to increase everyone's natural cognitive abilities. It is terrific isn't it? It is not though. On the dark side we have unresolved ethical issues related to dependence and cheating. Biohacking is not about working on yourself. It is about hacking your body and getting dependence on outside help without hard work on breaking your limits. Of course they do not have side effects and smart drugs will never cause clinical dependence but they can cause psychological one.

Anyway, there exists another point of view. We are already hacking our nature with antibiotics, for example, which made a revolution in the 20th century.

Obviously nootropics will become a main-stream in the nearest future. But the main question which we have is "Do we really need to hack our brain with nootropics, as we

need antibiotics to kill germs or other pharmaceutical substances which help us treat different diseases. I think, it is a very important question to which everyone will be able to find an appropriate answer in the nearest future.

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A LIGHT-EMITTING DIODE LAMP (LED LAMP)

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"The usual electric bulb was shining all the 20th century, the LED lamp will light all the 21st century" – the permanent secretary of Royal Swedish academy of Sciences Staffan Normark said.

Isamu Akasaki, Hirosi Amano and Syudzi Nakamura got the highest scientific award for making reliably working blue LEDs (new bright, energy efficient and long-lasting sources of this world) on the basis of semiconductors. The LEDs radiating light in the green and red ranges were created long before these scientists. But there were not enough devices shining blue. So it was impossible to receive white light which is a combination of green, red and blue light.

History of creation

The first blue LED was created in 1971 in RCA company by Jacques Panko on the basis of gallium nitride. The first industrial blue LEDs on the basis of silicon carbide were produced a lot in the 1980th. However their brightness was very poor therefore they weren't widely spread.

In the late 80s Isamu Akasaki and Hirosi Amano at the Nagoyi university created blue LEDs on the basis of gallium nitride (GaN), having improved the method of epitaxial crystals growth. In the early 90s a Japanese engineer Syudzi Nakamura working at that time for the Japanese corporation “Nichia Chemical Industries” developed the technology of industrial production of blue and green LEDs, having applied flavovirent phosphors on the basis of alyumo-yttrium pomegranates to cover blue LEDs and create LEDs of a white luminescence.

By 1993 Nichia company had began the industrial production of blue LEDs of new type. By 2002 the share of production of blue LEDs at the company increased up to 60 percent from total production. On the same principle it was succeeded to create ultra-violet LEDs.

Isamu Akasaki`s advice

According to Isamu Akasaki, many scientists who began researches together with him in the field of LEDs gave up studying, decided that it is impossible.

Speaking at a press conference in the city of Nagoya, Akasaki advised young scientists "to do always what you want to do".

“I never thought of success or failure, and just did what found necessary” – the scientist said.

Use of LED lamps

If two-three decades ago the LED was used only as the indicator in devices, nowadays it is becoming more popular than traditional light sources.

The most different lamps are made with LED modules. In our houses there are LED tapes and linear lamps on their basis: flat lamps for decorative or local lighting, furniture lamps, searchlights.

Advantages of LED lighting systems:

1. Correctly designed LED light devices provide high uniformity of lighting.

2. These are digital devices which features can be regulated by managing systems.

3. The energy efficiency of LEDs can be up to 5 times higher, than at glow and halogen lamps.

4. Service life of LEDs is several times higher, than at traditional light sources.

5. LEDs do not make IK-radiation and can be established where IR heating is undesirable.

6. Unlike fluorescent lamps, LEDs do not radiate the harmful ultraviolet rays destroying some materials and discoloring paints.

7. LED light sources can work at low temperatures and vibration.

8. RGB lamps can reproduce millions of colors and have different color temperatures without using the light filters.

9. Time for warming up or shutdown is not required

10. LED lights are physically small

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THE FUTURE OF THE NEURAL NETWORKS

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Stanford graduate student Kaidi Cao will join fellow AI researchers Jing Liao, of City University of Hong Kong, and Lu Yuan of Microsoft at SIGGRAPH Asia in Tokyo this December to present their incredible caricature-drawing neural network.

That's not bad, taking into account that Cao was only an intern at the Visual Computing Group at the Microsoft Research Lab in Beijing when he worked on the project.

The AI, actually a pair of generative adversarial networks (GAN), is called CariGANs. The first of its neural networks, CariGeoGAN, determines the geometry of a face in a photograph and maps it to a caricature model. CariStyGAN, the other half of CariGANs, does the "style transfer", or applies the artistic look to the geometry map.

In order to imbue CariGANs with the ability to turn a relatively boring photograph into a delightful feast for your eyes (tourists on the boardwalk, I'm talking to you) the system was trained on thousands of hand-drawn images.

To determine the efficacy of the machine, the researchers conducted two studies. The first was to ensure the AI's caricatures retained the identity of the portrait subject. The assertion here is that a good caricature has to capture a person's essence in exaggerated form. According to the researchers, respondents indicated the CariGANs caricatures were compared favorably to hand-drawn artists'.

The researchers conducted the second study to determine if the overall effectiveness of the "drawing" was compared with human-drawn pieces. This too appears to indicate success:

Note that ours is ranked better than the hand-drawn one 22.95% of the times, which means our results sometimes can fool users into thinking it is the real hand-drawn caricature. Although it is still far from an ideal fooling rate (i.e. 50%), our work has made a big step approaching caricatures drawn by artists, compared to other methods.

The CariGANs AI can also parse frames from video and create caricatures from it. Basically, it can generate a drawing from a single frame that is consistent with ones generated from other frames. The source images in the following picture are taken from the individual frames of a public-domain video of the President speech.

This could be incredibly useful for animators. It's also a hilariously spot-on way to look at the president, and proof that "art" created in tandem with an AI can stir something in the human spirit.

The CariGANs AI can also reverse-engineer a caricature and determine what the person in the cartoon really looks like. The researchers say "We believe it might be useful for face recognition in caricatures."

That sounds a bit terrifying. But if it means I can use an ink drawing of myself with a giant head and a sombrero as an ID in the future, count me in.

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TO THE QUESTION OF STUDYING TECHNICAL SUBJECTS: FOREIGN LANGUAGE AT NON-LINGUISTIC HIGH SCHOOL

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Nowadays if you want to be a specialist in the chosen technical industry, you should follow modern discoveries all over the world. One of the most important criteria that determines qualification of an engineer is the foreign language skills. A large amount of literature which contains the necessary information is written in English.

The process of foreign language teaching in non-linguistic high school has no enough quality of preparation. Unfortunately, this tendency is typical for all institutions that get bachelor and masters training in non-linguistic fields. Without formed basic foreign language skills it is impossible to develop the terminological base, vocabulary, skills of reading fluently and other communicative, linguistic and intercultural competences.

The most effective and acceptable method of foreign language teaching for technical students is the introduction of studying certain main subjects in English, which will allow the students to adapt more quickly in foreign literature. For example, for students of the aerospace radio-electronic systems department, you can enter a number of subjects in English from the 3rd course, such as Digital Signal Processing, Radio Automatics, Radio Engineering Systems, etc. This will allow future engineers to replenish their knowledge not only from a technical point of view but also to adapt easy in reading of scientific foreign literature.

To introduce this practice, it is necessary to modernize higher education system. First of all it is important to develop a curriculum, teaching methods, as well as calculate credits for each of the chosen discipline, and subsequently increase the number of hours spent on them.

Thus, it is necessary to divide the study program into two stages that a student assimilates received information better. The first stage is preparatory, where the student receives information in foreign language directly in the classroom. He studies the skeleton of necessary knowledge, which will subsequently help him to understand the obtained material at later stage. The student learns grammar and vocabulary on the base of technical texts in the specialty. He should do grammatical reviews on topics, situational exercises, make dialogues, solve tasks on projects, etc.

The second stage is the lecture classes (teaching of the subject in English). This allows the student to consolidate the material obtained in the previous step, he will quickly learn English immersed in the language environment. This technique assumes that teachers of subjects in profile introduce modern technologies into the lecture course: presentations, videos with famous lecturers of foreign universities (edx.org, udacity.com, coursera.org) and special literature (datasheets, newspaper articles, etc.). It will also help to work freely with programs, in which the entire interface is often designed and written in English.

The introduction of such method into the education of non-linguistic universities will help future engineers to learn a foreign language quickly. Besides this continual study of language and language environment will help to develop communicative skills, master professional terminology, increase the pace in learning of foreign literature and writing documents.

CLOUD TECHNOLOGY DEVELOPMENT

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The development in society has led to the emergence of new technologies, and to the transformation in education, business, manufacturing, etc. In the modern world, cloud technologies are widely distributed, the essence of which is to store the necessary data and information on special servers or in storage systems. Businesses need mobility, access

speed, economy and reliability of the information. Special online services provide access to the necessary information.

“Cloud” technologies help to systematize teamwork by creating a business plan, providing access to various presentations, materials, etc. The use of such technologies reduces the company's costs for the acquisition of servers, licensed software,as well as for electricity. In order to access the documents of the entire team, you need to share the disk, that is, provide access to the folder or files. Almost all "cloud" services have the ability to open access to the information via links, or you can simply specify the mail that should receive the necessary file. For high-quality work with these technologies, you must have a high-speed Internet connection, possess the skills to synchronize data and ensure the confidentiality of data from unauthorized persons.

The history of the development of the cloud technologies

In the 70s, when the Internet began to develop, the developers thought about processing and placing information on remote servers. In 2002, Amazon introduced the idea that customers received not only hosting for storing data, but also the computing power that resided on the company's servers. New services and programs were introduced which allowed clients to use their resources more efficiently.

There are three cloud computing service models. The first one is infrastructure as a service (IaaS). Consumer provides tools for data processing, storage, networks and other basic computing resources. For example, common overseas Amazon server. Platform as a service is the second model (PaaS). Consumers are provided with tools for deployment in the cloud infrastructure. A typical example is website hosting. And the third is software as a service (SaaS). The consumer is provided with software - provider applications running on the cloud infrastructure. One of the most common examples is Google mail. It is also necessary to highlight several models of the other cloud computing services. Among them: the deployment model of cloud technologies, for example, private, public and hybrid (a combination of private and public). Regarding public models, users do not have the right to maintain data “clouds”, private is used within the corporate network. Hybrid "cloud" provides services, some of which are public, and others - private.

Advantages of the cloud technologies

Cloud services have many advantages compared to conventional servers installed in companies.

1. Accessibility. Information in the cloud has high availability, which is around 99,999, which can only be supported by large service providers. Anyone who has a computer, tablet, any mobile device connected to the Internet can get access to the information stored on the cloud.

2. Mobility. The user does not have a constant attachment to one workplace. From anywhere in the world, managers can receive reports and monitor the production.

3. Efficiency. The user does not need to buy expensive powerful computers and software, as well as he is exempt from the need to hire a specialist in servicing local technologies.

4. The ability to rent computing power. The user receives the necessary package of services only at the moment when he needs it, and pays only for the number of acquired functions.

5. Flexibility. All necessary resources are provided by the provider automatically.

6. High manufacturability. Large computational power that is available to the user, which can be used for storing, analyzing and processing data.

7. Reliability. The reliability that modern cloud computing provides is much higher than that of local resources, since few enterprises can afford to acquire and maintain a complete data center.

Summary

Cloud technologies play an important role in our modern life. They reduce labor costs in various organizations that ensure control and speed of access to the information, systematization in the field of education and reliability of the information protection.

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ARTIFICIAL HUMAN ORGANS GROWN IN VITRO

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The human body consists of many different types of cells that allow our organs to perform various functions, from the production of digestive enzymes and hormones to the generation of sensations and thoughts.

Stem cells are cells that can generate a number of these specialized cells and continuously produce copies of themselves in a process known as self-renewal.

Given their potential for creating such a diversity of cell types, there is a growing expectation of what these cells can do. One of the main achievements of stem cells is the artificial growth of organs.

Organ models that are cultivated in the laboratory from human stem cells and turn into living tissue are one of the most important scientific achievements of recent years. Scientists, patients and the general public have high hopes for this new area of research. In vitro organ models allow for complex studies of organ development and pathogenetic analyzes directly in human tissues. New substances and treatments can be tested on human material much faster using this technology. Regenerative medical practice appears to cultivate the desired tissue in the laboratory from the patient's cells and reduce dependence on organ donations.

Organoids are high hopes and bioethical dilemmas. From an ethical point of view, this new technology causes a number of problems. These include important warnings regarding the use of human embryonic stem cells or the use of gene therapy to prevent or treat a disease.

The first “target” of researchers was the kidney. Attempts to obtain precursors of renal cells were made earlier, but they could not be formed from mature kidney cells. These so-called embryoid bodies are the result of spontaneous differentiation of human embryonic stem cells.

First, the researchers obtained renal progenitor cells. For this, human embryonic stem cells were differentiated into mesoderm cells (middle germ layer), from which the skeleton, muscles, blood vessels, and kidney were developed. Then, by adding the growth factors necessary for the natural development of the kidney to the culture medium, the progenitor cells of the kidney tissue were obtained with an appropriate set of cellular markers.

Despite the fact that the renal structures obtained cannot be called the real human kidney, the results of this experiment greatly expanded the potential possibilities of regenerative medicine. Scientists have the ability to mimic kidney disease and test drugs. As a first step, a three-dimensional renal structure was obtained from the stem cells of patients with polycystic kidney disease.

The successful formation of kidney-like structures from human pluripotent cells, although slower than other types of tissue, brings hope for new therapies that can help millions of people.

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COGNITIVE SCIENCE

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As the title implies the abstract describes one of the twelve classic cognitive distortions and allows you to understand this issue in more detail. It is specially noted to

the description of the differences between the two terms: personalization as cognitive distortion and personalizing bias should be stressed. Consider falsification of hypotheses about the architecture of human mind.

Cognitive science is a multidisciplinary approach to the study of mind and intelligence. Its main goals are to draw the architecture of cognition and to understand how cognition enables an organism to interact with and to produce adaptive behaviour within its environment. Cognitive science has also been defined as the study of the different forms of intelligence that characterize the domains of humans, animals and machines.

Personalization constitutes one of but twelve classically defined cognitive distortions: emotional reasoning; over-generalization; arbitrary inference; dichotomous reasoning; should statements; divination or mind-reading; selective abstraction; disqualification of the positive; maximization/minimization; catastrophizing; personalization; mislabelling Personalization is usually defined as the fact of attributing unduly to oneself the cause of an external event. For example, seeing a person who laughs, the patient thinks that it is because of his/her physical appearance. Also, the patient makes himself / herself responsible for a negative event, in an unjustified way. If his / her companion then failed his/her examination, the patient estimates that is due to the fact that he/she is depressed. In what follows, we propose first to clarify the definition of personalization and to situate it in the context of the theory of cognitive distortions.

The difference between the terms personalization as cognitive distortion and personalising bias should be stressed. Firstly, in personalisation as cognitive distortion, the patient attributes the cause of an external event to an event which concerns the patient himself / herself; on the other hand, in personalising bias the patient attributes the cause of an internal event to external persons. Secondly, in personalisation as cognitive distortion, the "person" is the patient himself / herself, while in personalising bias, it consists of external "persons". Finally, in personalisation as cognitive distortion, the internal event is indifferently of a positive, neutral or negative nature, whereas in personalising bias, the internal event is of a negative type.

The cognitive processes investigated and their modular physical counterparts are defined as types of organism/world interactions like social cognition, parenting and

foraging rather than more abstract functions like memory or attention. The study of cognitive impairments and of their double dissociations in patients with specific brain damages, and the use of neuroimaging techniques to understand which brain regions are more active during the execution of specific cognitive tasks have thus become crucial steps in the construction and the falsification of hypotheses about the architecture of human mind.

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NVIDIA RTX TECHNOLOGY

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The NVIDIA RTX platform fuses ray tracing, deep learning and rasterization to fundamentally transform the creative process for content creators and developers through the NVIDIA Turing GPU architecture and support for industry leading tools and APIs.

Applications built on the RTX platform bring the power of real-time photorealistic rendering and AI-enhanced graphics, video and image processing, to enable millions of designers and artists to create amazing content in a completely new way.

The RTX platform includes:

- Ray Tracing (OptiX, Microsoft DXR, Vulkan)
- AI-Accelerated Features (NGX)
- Rasterization (Advanced Shaders)
- Simulation (CUDA 10, PhysX, Flex)

Ray tracing

Ray tracing, which has long been used for non-real-time rendering, provides realistic lighting by simulating the physical behavior of light. Ray tracing calculates the color of pixels by tracing the path that light would take if it were to travel from the eye of the viewer through the virtual 3D scene. As it traverses the scene, the light may reflect from one object to another (causing reflections), be blocked by objects (causing shadows), or pass through transparent or semi-transparent objects (causing refractions). All of these interactions are combined to produce the final color of a pixel that then is displayed on the screen.

Artificial Intelligence (AI)

The NVIDIA NGX SDK is a new deep learning powered technology stack bringing AI-based features that accelerate and enhance graphics, photos imaging and video processing directly into applications. NVIDIA NGX features utilize Tensor Cores to maximize the efficiency of their operation, and require an RTX-capable GPU. NGX makes it easy for developers to integrate AI features into their application.

Rasterization

The Turing architecture's new Streaming Multiprocessor (SM) includes advanced shading technologies, as well as new features designed to accelerate the graphics pipeline.

Mesh Shading

Mesh shading advances NVIDIA's geometry processing architecture by offering a new shader model for the vertex, tessellation, and geometry shading stages of the graphics pipeline, supporting more flexible and efficient approaches for computation of geometry.

Variable Rate Shading (VRS)

VRS allows developers to control shading rate dynamically, shading as little as once per sixteen pixels or as often as eight times per pixel.

Texture-Space Shading

With texture-space shading, objects are shaded in a private coordinate space (a texture space) that is saved to memory, and pixel shaders sample from that space rather than evaluating results directly.

Multi-View Rendering (MVR)

MVR allows rendering of multiple views in a single pass even if the views are based on totally different origin positions or view directions.

Simulation

Lifelike visuals result when something both looks and behaves as it would in reality. With more than a decade of development in physics simulation, the RTX platform features APIs such as NVIDIA's PhysX, FleX and CUDA 10, to accurately model how objects interact in the real world in games, virtual environments, and special effects.

Disadvantages:

1) super high-price;

2) not released in many games;

3) first-gen pain for early adopters.

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SCIENCE AND TECHNOLOGIES

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It is difficult for modern human to imagine his life without science or technologies. They surround us everywhere. It seems that this close interconnection, this vicious circle cannot be broken for nothing. Science helps to create new technologies. And those, in their turn, allow us to develop science with incredible speed.

Science is the component of our life that makes it more replete, convenient and interesting. There are new inventions that allow you to explore space, new technologies that make us closer to each other, new vehicles that help to get to the right place much faster.

It seems that science is developing at the speed of light. Moreover, it is the scientists and the technologies, that they use, help us to explore and take a fresh look at such seemingly ordinary things, such as light, sound, space, and especially people.

For more visual sample of their importance, let's take space exploration. With the help of modern technologies and human intelligence, we can explore the neighboring planets, galaxies. We are seeking new habitats, new representatives of life. People always strive for something new, unexplored and interesting. Probably each person of the 21st century at least once in their life heard the name of Ilon Mask. But only few know that recently he have successfully launched the super-heavy rocket, Falcon Heavy, into space. Booster sent a personal car of Ilon Mask, the head of Space X, red cabriolet Tesla Roadster. There are surveillance cameras in the car that will record unique moments from orbit for hundreds of millions of years.

Where else can the inherent presence of science and technology be seen? Undoubtedly, in medicine. Modern equipment supports our life and even saves it every day. Every day scientists try to come up with something new that would save humanity from diseases and suffering. New Zealand and Japanese scientists invent a virus that will kill cancer. Japanese scientists are changing the human genocode, contributing to the birth of HIV-negative children, Italian scientists create the first prosthetic arm that can feel touch.

It seems that people nowadays have everything necessary for everyday life, but science never stops in development. It is always interested in learning the secrets of the universe, in conquering the earth and air. This incredible thirst for knowledge leads to a constant increasing in standards of living.

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VERBALISATION OF THE U*KRAINIAN-RUSSIAN CONFLICT* CONCEPT IN THE ENGLISH ONLINE MEDIA DISCOURSE

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At present, the theory of the concept is one of the leading in the Ukrainian linguistics and attracts considerable attention of many scientists. In particular, the researchers consider the representation of a variety of concepts in mass media. Though, the Ukrainian-Russian Conflict concept, which was actualized in 2014, is currently left out of the attention of scholars. However, its investigation is extremely relevant, since it allows to understand the views and attitudes towards the tragic page in the history of Ukraine that occur in modern foreign mass media and become elements of the Europeans and Americans worldview.

So, the study aims to identify the peculiarities of the linguistic representation of the Ukrainian-Russian Conflict concept in the informational and analytical resources of the British and American news agencies BBC and CNN, as well as the online editions of *The Guardian*, *The New York Times*, *Reuters* and *Washington Post*.

The object of the research is the lexemes, which represent the Ukrainian-Russian Conflict concept and its subconcepts, available in the texts under consideration. Materials for research are publications related to the Ukrainian-Russian relationship, presented on the sites https://edition.cnn.com, https://www.theguardian.com/us, www.bbc.com, https://www.washingtonpost.com, https://www.nytimes.com, https://www.reuters.com.

The theoretical and methodological basis of the research consists of the works of scientists who studied concepts, in particular V. Karasik, V. Maslova, M. Skab.

In the analyzed English online publications, the Ukrainian-Russian Conflict concept clearly divides into such subconcepts as *fight for the territory, economic standoff, media war (info war), language war, struggle for religious independence*.

Each of these subconcepts contains such semantic components as ***parties to the conflict*** (Ukraine and Russia), ***ways of interaction*** (hostilities, sanctions, embargoes, various restrictions, entry bans, etc.), ***agents of influence*** (the authorities of the both states, the EU and the USA), ***objects of influence*** (Ukrainians), ***negative consequences*** (death and wounds of militaries and civilians, damages, loss of territory), ***allocation*** (first of all Donbass, east of Ukraine, Crimea, water area of the Azov Sea), ***conflict resolution*** (negotiations, Minsk agreements, reintegration, sanctions, martial law). All these elements are verbalised through a set of the lexemes that represent both ontological (facts) and axiological (ideological orientations) components.

To conclude, the Ukrainian-Russian Conflict concept really gets a multifaceted verbalisation in the publications of the English online media. At the same time, its representation remains rather neutral – the media do not use the evaluative vocabulary, the diversity of epithets and metaphors, and do not offer a clear assessment of the conflict, adhering to the stylistics of the most impartial neutral tone.

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PROGRESS IN FUSION RESEARCH

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Fusion reactor, also called fusion power plant or thermonuclear reactor, is a device to produce electrical power from the energy released in a nuclear fusion reaction.

Since the 1930s, scientists have known that the Sun and other stars generate their energy by nuclear fusion. They realized that if fusion energy generation could be replicated in a controlled manner on Earth, it might very well provide a safe, clean, and inexhaustible source of energy. The 1950s saw the beginning of a worldwide research effort to develop a fusion reactor.

A magnetic device first developed by Soviet researchers in the late 1960s, which essentially simulates the intense heat and pressure inside the internal furnace of a star. the device uses a powerful electrical current to break down hydrogen gas, stripping away electrons from the nuclei to form plasma – a hot, electrically-charged gas. As the plasma particles become energized and collide, they heat up, eventually reaching a temperature between 100 and 300 million degrees Celsius (about 180 million to 360 million degrees Fahrenheit). At that point, the hydrogen nuclei are so energized that they can overcome their natural tendency to repel one another, so that they can fuse to form helium. In the process, they release enormous amounts of energy.

Main Difference

Nuclear Fission. According to nuclear physics and nuclear chemistry, nuclear fission is a nuclear reaction or a radioactive or nuclear decay process that results in the splitting of a nucleus of an atom into smaller parts or lighter nuclei. The fission process generates free neutrons and photos in the shape of gamma rays and also emits a large quantity of energy even by the energetic standards of radioactive decay. The first nuclear fission of heavy elements was discovered in December 17, 1938 by German Otto Hahn. Nuclear fission is a form of nuclear transmutation as the resulting fragments are not the same element as the original atom. Most nuclear fissions are binary fissions that produces two charged

fragments but sometimes these produces 2 to 4 times charges fragments per 1000 events as can be observed in case of ternary fission in which three positively charged fragments are generated.

Nuclear Fusion. Nuclear fusion is a nuclear reaction in which two or more atomic nuclei come close to generate a new type of atomic nucleus when they collide at a very high speed. During the whole process, matter is not conserved as come the matter of fusing nuclei is converted to photons. It is the process that powers active or main sequence stars. The fusion of two nuclei with lower masses than iron generally releases energy, while the fusion of two nuclei with heavier masses than iron generally absorbs energy. Fusion reactions of light elements power the stars and produce virtually all elements in a process called nucleosynthesis. The fusion of lighter elements in stars releases energy and the mass that always accompanies it. The method for achieving fusion includes: thermonuclear fusion, inertial confinement fusion, inertial electrostatic confinement, beam-beam or beam-target fusion, muon-catalyzed fusion, antimatter-initialized fusion, hybrid nuclear fusion-fusion, etc.

Key Differences

- Nuclear fission means splitting of a nucleus of an atom into two or more smaller parts. Nuclear fusion means the fusing of two or more lighter atomic nuclei to form a new type of atomic nucleus.
- Nuclear fusion is a natural process as it occurs in stars and suns while nuclear fission doesn’t occur naturally.
- Nuclear fission produces many highly radioactive particles as compare to nuclear fusion.
- Both nuclear physics and nuclear chemistry deals in nuclear fission while nuclear fusion is only dealt by nuclear physics.
- Very little energy is required to split to atoms in a fission reaction while extremely high energy is required in case of nuclear fusion.
- Uranium act as a fuel in nuclear fission while hydrogen isotopes like deuterium, and tritium are used as primary fuel in nuclear fusion.

- The energy released during nuclear fusion is three to four times greater than the energy released during nuclear fission.

General Characteristics

Fusion reactions are inhibited by the electrical repulsive force, called the Coulomb force, that acts between two positively charged nuclei. For fusion to occur, the two nuclei must approach each other at high speed in order to overcome their electrical repulsion and attain a sufficiently small separation (less than one-trillionth of a centimetre) so that the short-range strong force dominates. For the production of useful amounts of energy, a large number of nuclei must undergo fusion; that is to say, a gas of fusing nuclei must be produced. In a gas at extremely high temperatures, the average nucleus contains sufficient kinetic energy to undergo fusion. Such a medium can be produced by heating an ordinary gas beyond the temperature at which electrons are knocked out of their atoms. The result is an ionized gas consisting of free negative electrons and positive nuclei. This ionized gas is in a plasma state, the fourth state of matter. Most of the matter in the universe is in the plasma state.

At the core of experimental fusion reactors is a high-temperature plasma. Fusion occurs between the nuclei, with the electrons present only to maintain macroscopic charge neutrality. The temperature of the plasma is about 100,000,000 Kelvin (K; about 100,000,000 °C, or 180,000,000 °F), which is more than six times the temperature at the centre of the Sun. (Higher temperatures are required for the lower pressures and densities encountered in fusion reactors.) A plasma loses energy through processes such as radiation, conduction, and convection, so sustaining a hot plasma requires that fusion reactions add enough energy to balance the energy losses. In order to achieve this balance, the product of the density of plasma and its energy confinement time (the time it takes the plasma to lose its energy if unreplaced) must exceed a critical value.

For terrestrial applications, there are two main approaches to controlled fusion – namely, magnetic confinement and inertial confinement.

In magnetic confinement a low-density plasma is confined for a long period of time by a magnetic field. The plasma density is roughly 10^21 particles per cubic metre, which is many thousands of times less than the density of air at room temperature. The energy

confinement time must then be at least one second—i.e., the energy in the plasma must be replaced every second.

Principles Of Inertial Confinement

In an inertial confinement fusion (ICF) reactor, a tiny solid pellet of fuel – such as deuterium-tritium (D-T) – would be compressed to tremendous density and temperature so that fusion power is produced in the few nanoseconds before the pellet blows apart. The compression is accomplished by focusing an intense laser beam or a charged particle beam, referred to as the driver, upon the small pellet (typically 1 to 10 mm in diameter). For efficient thermonuclear burn, the time allotted for the pellet to burn must be less than the disassembly time. This means that, in the compressed state, the product of the pellet mass density and the pellet radius must exceed about 3 grams per square centimetre. A high mass density will hasten the burn, and a large radius will slow the disassembly time. The ratio of fusion energy produced in the pellet explosion to the driver energy is called the pellet gain. High pellet gains of 100 or more are required for an ICF reactor.

ADRESSLESS MEMORY AND PARALLEL COMPUTING

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Concept of computing

The existence of programming languages, logic elements, controllers and computing in general is not accidental. Our entire universe lends itself to a logical (computer) description using an “alphabet” of only two characters. However, tools, methods and goals are needed for this. All of them are combined in the complex notion of computing, which in this case is required to be understood as the processing of information by means of several main components: the actual data ready for processing, the memory for storing them, the logics of their processing, etc. The power, quality and type of components used determine the main characteristic of the computer – the speed at which the result is obtained. There are various ways of converting computing, but parallelism is rightly

considered the most effective. Below are the main operations with data processing components aimed at introducing concurrency into computing technologies.

Logical device exception

What do we need to process some data? The answer is simple: the data itself is stored in a reliable memory segment, as well as a computational unit that can read data and produce a result. As we have already found out, the main characteristic of this process is speed, and the presence of a device separated from the storage directly affects it. It seems that such a delay is negligible, and it can be discarded. And this is so – modern processing units refer to the memory section for fractions of milliseconds. But still there are certain subtleties. Of course, in a typical home PC, the standard computing speed is more than enough. Now imagine that you need to process every bit of all the information in the world. Even the smallest delay in accessing a new bit will result in an unrealistically long time to perform this abstract task. Besides, the ideal does not exist, and why not make today's algorithms even faster? And so, it is necessary to solve the problem of the access time of the processing device to the memory. If it cannot be reduced, then why not remove it at all? To do this, you need to find a new way to implement processing logics in close proximity to the data, that is, in the memory itself. This task is extremely difficult and some scientists are making a lot of efforts to perform it. The goal is to literally give complete independence to the storage device in terms of processing content, thereby reducing the number of components of computing. Conventionally, this can be considered as minimization, which leads to simplification and, consequently, acceleration. Of course, we will still watch for a long time to create such a modification of memory, but this is not the only option. Even having solved the problem with delays in the passage of a signal, we will be left alone with another problem – a strict sequence in addressing a certain place in memory.

Adressless storage devices as the basis of parallelism

Well, we know a lot about how to create a memory device, how it functions and how it should be used. There are devices varying in size, capacity, materials, methods of reading and writing, but they have one thing in common – the so-called address space. Any modern computer when trying to access any segment of this space uses the address.

This is a convenient and reliable method of storage in which all information is strictly preserved, and is damaged only as a result of very rare errors. An integral feature of this technology is that the computer refers to a single address at a time. There is a conditional solution to this problem, namely the joint work of several computing units and several storage devices, such as mainframes or multiprocessor computers, but we have already said that we need to minimize the speed, and not to increase the number of units. And we get another difficult task for more than one generation, I think – to create a memory in which the search will be carried out not by addresses, which should allow a single computing unit to perform several operations at once in this memory. Such a memory could be the concept of associativity of the repository, but presumably its inaccuracy is too high price. There are many ideas from the implementation of such space in crystals to the use of quantum particles. And so, mankind faces a new challenge – to find a way to develop computing even higher than it is now, and parallelism is quite likely the key to its solution.

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MAN AND SOCIETY: THE SEARCH FOR OWN IDENTITY

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We would like to touch upon the topic concerning a man and part in our society. Man and society are considered as one unit, but at the same time two completely separate units of this world. In the foreground, the society, and then the man. Although it is completely

illogical. Why we consider them separately, because the person is a society. Moreover, whom can we consider a full-fledged person or a full-fledged society?

In simple language, it turns out that a person, as a unit of society does not solve anything, not only that, he / she is constantly in a state of conflict between themselves and society. As a result of such tense relations there is a huge outflow of energy from the person into society, and the society itself is a kind of the vampire for the person. In the first place because of such wrong relationships suffers psyche and self-esteem of the person, he loses all his life energy to solve various life problems, which is faced in everyday life, as soon as he leaves the house. To replenish his energy, he has to constantly make compromises by embedding in society. Thus, people in general, perform the same functions and become similar to each other, as the cogs of one Global Mechanism, there is a sort of standardization of internal "I" and the person itself loses its individuality, and the personality Erased.

One can say that there is no individuality, as well as the personality itself. But if there is no personality, what is the identity of a person with society?

The identity of a person in modern society prefers an individualistic utopia of happiness, detached from interpersonal connections, from Love and truth, from responsibility and common sense –full relativism and associated nihilism of values, full of axiological, moral, religious, ideological emptiness. That is, we can assert that the modern individual identity of a person with the society is questioned.

People must live socially, and social structures are created to serve them in their life calling. Each common value, which can be realized only in social cooperation, has a personal character. This means that the person is focused on the participants of public life. Man can never be regarded as a means of realizing values because he is their creator and purpose. To do this, he creates common values with others so that they evolve and improve. The welfare of the human person and the common good are two extremes which constitute a social order in mutual cooperation and addition.

Thus, we can conclude that individual identity of a person in a society is present. In general, the society needs to build its own system of relationships with the surrounding world, which requires a man of extraordinary and courageous decisions, and everyone is

clearly not capable of this because you have to break all the created or imposed stereotypes and start first of all from yourself.

TRANSPORT & ENERGY. UNFAVOURABLE PROGRESS

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It is believed that progress has significantly changed our lives. Just by such an abstract word, 'progress', we mean all those discoveries in science and technology that have made it possible to saturate our lives with new hi-tech devices which were designed to make our lives easier. That is how it is supposed to be, but is everything clear with it?

On whatever side to look at, from year to year, our homes are replenished with new gadgets and at the same time new discoveries are made. The problem is that the main stream of our life does not seem to be changed. Just as 50 years ago, the basis of the energy complex is still exhaustible resources and the most popular means of transport are cars that use oil to move. Of course, it is impossible to deny that there are some really good types of transport such as hyper trains and electric cars have become more common but all this has no point as, unfortunately, almost all the electricity is produced using the same resources.

So why the progress is not so even: it completely turns one sphere of life and at the same time almost does not affect the other one? To answer this question we need to look from the point of view of economics and policies. The fact is that it is not profitable. The economies of entire countries have grown on the sale of fuel resources. So now it is clear why big research is not held in this area. One way or another, resources are depleted, and their consumption is growing. The question is whether we will be ready when they run out.

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SMART CONTACT LENSES

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Contact Lens is a smart contact lens project announced by Google. The project aims to assist people with diabetes by constantly measuring the glucose levels in their tears. The project was being carried out by Verily and as of 2014 was being tested using prototype. Verily announced it has discontinued the project.

The smart contact lens has a shape like a normal lens, but it can do more than that. Google’s smart lens helps a lot, it can measure the glucose levels in your tears without needing to go to the doctors. In the future, rather than going to the doctors, you can just wear these lenses and you will be good to go.

This new lens (Google smart lens) invention is created by Brian O. and Babak P. who were both members of the electrical engineering group, they created this new technology because they are looking for a technology which helps by developing apps that would make lives for “difficulty in life people” have a better time. These lenses have a miniaturized glucose sensor.

The tears collector collects tears into the sensor (a chip that detects glucose).

Some people consider that this creation may harm your eyes and it is easy to lose this lens because of its size, another people like it very much because they understand that this creation can really help people who have high or low glucose.

In the future, Google smart contact lens want to add a led light to it, the reason for it is because it can warn the wearer by lighting up when the glucose levels have crossed above or below certain levels.

HOW TECHNOLOGY IS INVOLVED IN JEWELRY MAKING

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Jewelry art is one of the facets of human life. By the way jewelry has changed it is easy to trace the development of the culture of various epochs and peoples starting with the most ancient times and ending with the present day. The history of jewelry began long before our era. True, then the jewelry carried in itself an additional semantic meaning – they indicated that the owner belonged to a certain tribe, and also served as an amulet, which was designed to protect against evil spirits and natural disasters, as well as to attract good luck during the hunt. When creating ancient prototypes of pendants, earrings or necklaces, colored pebbles and mother-of-pearl shells, animal teeth and bones, wooden sticks and fancy seeds were used in the business.

Nowadays, all the work that lay on the shoulders of jewelry masters with a great tempo passed onto the shoulders of technology and machines, which reduced manufacturing time and increased the possibility of creating interesting and beautiful shapes, as well as increased quality, which is also important for the end consumer. Let us consider how technologies are introduced using the example of two products “Rings” and “Chains with anchor plywood”. Let's start with the chain.

After the gold ingot is cast, it gets into a special machine where it is rolled into a thin plate, after which the plate is pressed away to the furnace where the stresses are removed and give plasticity for long-term supports after the furnace, the plate is twisted into a gold wire and again sent to the furnace to relieve stresses in the metal. The gold wire enters the machine, the machine that bends the wire into rectangular links, connects the links between itself and seals the ends of the wire. At the next stage, a lock is put on the chain and polished to a shine, after which the ready-made chain comes to the shops.

With regards to the ring here everything is much more interesting, The ring begins its journey with a 3D model created on a computer that allows you to create interesting and not ordinary forms. At this stage, you can already see the finished appearance of the ring,

and also the creation of a model on a computer allows you to find out how much material will be needed to cast the product.

After the designer has finished the ring model, information from the computer is transmitted as a code to a special 3D printer. With the help of the code, the wax model of the ring called “Stencil” is being built. Stencil is a model of a ring made from wax, it is used in casting process . The main stencil is placed in a special cylinder called “Opoka”. Cylinder acts as a wall of the mold for pouring the Stencil with special gypsum. special refractory gypsum is poured into the flask already with the stencil inserted into it, which withstands high temperatures of the red-hot metal. Gypsum solidifies and after drying out it is placed in a casting machine where it is heated to remove the water and the metal managed to fill the mold and did not have time to cool ahead of time during the casting process. Molten over 1800 degrees Celsius, it enters a special casting channel under pressure, through it penetrates into a mold where it solidifies and forms a “ring casting”, casting is a product obtained during casting. Ring casting is passed to the master, where the master in turn removes excess metal and gives the product a finished look, polishes and fixes the stones, if they are. Sometimes engraving is applied to the rings (the date of the wedding or the names of the spouses), in which case the rings go to engraving. The engraver fixes the ring in a special machine where two laser beams apply text by burning the metal surface. After engraving, the finished product is transferred to customers where the ring ends its journey.

Conclusion: technologists greatly simplify the processes that are difficult for the human forces to provide, technologies also save time, which in turn increases the productivity of enterprises and improves the quality of the finished product that attracts the attention of customers and entrepreneurs

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AUTOPILOT

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Cars with Autopilot are used more and more each year. As many experts say, robomobiles are our future. For today, Autopilot is most common in electric vehicles, such as Tesla, Nissan Leaf, but in near future, this list will also include BMW, Audi, Chevrolet and others electric cars.

The main reason for using Autopilot is convenience. But Autopilot is also capable of making transportation safer. This statement confirms a large number of cases, and now I am going to tell you about one of them. A Tesla Model 3 owner claims that Autopilot 'saved his life' when a speeding car almost crashed into his vehicle on the highway. He commented on the incident:

"I am minding my own business in the right lane. It's a 90 km/h zone and I have Autopilot set at 102 km/h – and some dumbass comes out of nowhere, probably doing 150 maybe 160 km/h. I guess his intentions where to squeeze between me and the car in the left lane, but there wasn't enough room and Autopilot took evasive actions – and probably saved my life today."

By the end of November Tesla owners had driven 1 billion miles (1.6 billion kilometers) with Autopilot activated.

Many companies also create business models based on autopilot technology. For example, Waymo. Waymo, the secretive subsidiary of Google's parent company, Alphabet Inc., is planning to launch the world's first commercial driverless car service in early December, according to a person familiar with the plans. It will operate under a new brand and compete directly with Uber and Lyft. The customers who move to the new service will be released from their non-disclosure agreements, which means they'll be free to talk about it, snap selfies, and take friends or even members of the media along for rides. New customers in the Phoenix area will be gradually phased in as Waymo adds more vehicles to its fleet to ensure a balance of supply and demand.

Another company is Einride. Swedish tech startup Einride has built a full-scale prototype of its T-Pod, the electric autonomous transport vehicle it hopes will eventually replace smaller heavy-duty trucks, featuring remote control operation and a 200 kWh energy capacity with a maximum range of around 124 miles. The Einride T-Pod is unique in its design, as you can see, but it's designed from the ground up for remote human operation and driverless functioning, meaning you don't need the traditional crew cabin, and can instead build a vehicle tailor-made exclusively for transporting goods efficiently.

So, Autopilot technology is getting better and better, and it used in many areas. Electric cars and autopilot are our future and we should get used to it.

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COMPUTER-DRIVEN CARS OF 2050

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So what can we do in order to make the automobile of the year 2050 cleaner, safer, leaner and still enjoyable to use? This is a crucial question: mass-motorisation in emerging countries means there will be more than three billion vehicles on the planet in 2050, compared with around one billion today.

The automobile in 2050 will be self-driving. Companies are working on concepts allowing cars to cruise along on the highway without driver intervention.

There is the Super Cruise from General Motors, which controls the vehicle on long highway stretches when not much is happening. Then there is the Traffic Jam Assistant from BMW; cars move along in a congested traffic area just like a school of fish.

Will the driver need to do anything at all? Will there still be a steering wheel? Cars will probably require that drivers monitor what the vehicle does and switch from one mode to another – such as highway driving to city driving. There will probably still be a steering wheel, but some models could have a little joystick that the driver only uses rarely.

Driving is likely to get much safer (human error still accounts for the majority of all accidents) and also much more efficient, as centralised traffic control will lead to a smoother flow and less congestion. But how much of an effect this new technology has will depend on how widely it is rolled out.

The changes might not stop there. We may also have some other kinds of automobiles, which are small, highly efficient mobility pods similar to the GM EN-V concept or autonomous vehicles like the Induct Navia. These will be urban, flexible solutions to move people around.

In many metro areas, a well-organised public transportation system will be the most effective way to move large numbers of people. However, some commuters might not want to take it, either because of network problems, schedules or safety concerns. Publicly organised on-demand transportation systems that can accommodate up to six people will bring travellers automatically to their destination in downtown areas, and then move on to serve others. Customers will simply enter their destination and payment information – think of it as a totally automated taxi system.

Personal mobility will become more of a service, one that companies such as Google have recognised. The search and computing giant has become strongly involved in creating automated vehicles. And some think the car needs to serve us in other ways, whether we drive it or it drives itself. Many car companies are already working with Apple to integrate Siri into automobiles, creating virtual personal assistants in the car to help us

with routes, traffic information, and the scheduling of our day. Our vehicles will be fully integrated into the digital lifestyle of 2050 – whatever that turns out to be.

But what will actually drive these cars? Electricity? Hydrogen? Or will it still guzzle petrol and diesel? At first glance, one might think the good-old internal combustion engine is on its way out. However, its demise may not be quite so quick. In general, the daily commute will be in an electric vehicle with no combustion engine. The electricity grid is likely to include a much higher percentage of renewable energy by then, so everyday driving will be cleaner as well. But what about longer trips? Batteries might allow a 500-mile range, but they might be heavy and expensive, and recharging them might take time.

So, the ultimate solution for long-distance car travel might still be a combustion engine. Research is underway by institutions and car companies across the world to further improve efficiency and cut emissions. In 2050 a small, turbo-charged, rotary engine might serve as a range extender – used only a few days a year, but good to have on board. Another range extender might be wireless power transfer to the vehicle as it moves along the highway.

An alternative is hydrogen-powered vehicles, converting hydrogen into electricity in a fuel cell. This would result in a smooth electric drive and only water vapour coming out the tailpipe. While fuel-cell technology has already come a long way, there are still challenges to overcome, such as where to get the hydrogen from. It is unclear if there will be an answer by 2050.

NEURALINK

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At the end of March of this year, it became known that Elon Musk began another ambitious project: work on a neural interface that can directly connect the human brain with a computer.

The company is going to work in the field of BMI (brain-machine interface), with devices whose dimensions are measured in microns. Project's goal is to bring something to the market in four years that will help people with complex brain injuries (stroke, cancer damage, congenital injuries).

One of the problems that researchers and engineers will face is the amount of data transferred. So far, no more than a couple of hundred electrodes have been placed in the brain. The Neuralink team talks about simultaneous recording from 1 million neural cells.

Implant placement problems. Musk gives an example of the equipment used for laser eye surgery. Neuralink is going to create wireless devices. Another problem is biocompatibility, because the human body is rather inhospitable about the idea of implanting alien objects into it. We'll have to figure out a way to deceive the brain so that its tissues take these devices as a part of themselves.

Neuralink can help people to cope with their diseases, but the most incredible part of the project is that Neuralink will speed up our brain's ability to process and output information, and transfer information from the brain to the brain of another person. Neuralink will allow us to send each other photos, videos and our thoughts without using phones.

According to Musk, with the pace of development that artificial intelligence demonstrates, humanity will soon be left behind, in terms of intelligence lagging behind artificial intelligence, just like domestic cats are lagging behind humans. Solution to this problem is Neuralink.

GERMAN SECTION

MASCHINELLES LERNEN UND DEEP LEARNING

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In Zusammenhang mit maschinellem Lernen fällt in letzter Zeit immer häufiger der Begriff „Deep Learning“. Dieser bezeichnet laut Wikipedia „eine Klasse von Optimierungsmethoden künstlicher neuronaler Netze, die zahlreiche Zwischenlagen (engl. hidden layers) zwischen Eingabeschicht und Ausgabeschicht haben und dadurch eine umfangreiche innere Struktur aufweisen“. Seine Wurzeln hat das „tiefgehende Lernen“ in der Mathematikforschung der 1940er Jahre. Die fehlenden Rechenressourcen, um diese Lernmodelle umzusetzen und zu trainieren, verhinderten damals eine praxisorientierte Umsetzung. Es blieb bei der theoretischen Forschung, erst in den 1970er und 80er Jahren wagten sich Wissenschaftler an praktisch nutzbare Systeme. Bis etwa zur Jahrtausendwende waren die verfügbaren Rechenressourcen jedoch unzureichend.

Machine Learning umfasst eine breite Palette an Mechanismen, die einer Maschine ermöglichen, nicht regelbasiert, sondern statistisch zu arbeiten. Dabei kommen viele verschiedene Verfahren und Algorithmen zum Einsatz, die Grundidee ist letzten Endes aber, die Maschine durch Beispiele zu trainieren, anstatt Regel von Hand zu modellieren.

Deep Learning (tiefgehendes Lernen, Anm. d. Red.) ist ein Teilbereich des maschinellen Lernens, bei dem Algorithmen das Lösen von Aufgaben direkt durch die verwendeten Daten erlernen. Der initiale Lernprozess wird nicht mehr vom Menschen begleitet, sondern direkt von der Maschine übernommen. Sogesehen ist Deep Learning die partielle Automatisierung des maschinellen Lernens.

Maschinelles Lernen und Deep Learning ermöglichen das Lösen einer Aufgabe durch einen Computer. Beide Methoden werden beim maschinellen Sehen oder der Verarbeitung von Sprache angewendet. Eine typische Herausforderung ist die Klassifizierung von Bildern: Ein Algorithmus muss erkennen, ob ein Foto einen Fisch,

eine Robbe oder ein Boot zeigt. Damit das gelingt, werden Daten benötigt. Das können Bilder, Texte oder Audio-Dateien sein, je nachdem, was für eine Aufgabe die Maschine erfüllen soll.

Deep Learning vs. maschinelles Lernen

Der Prozess und die benötigten Ressourcen unterscheiden die beiden Verfahren. Beim maschinellen Lernen gibt der Mensch Testdaten mit der korrekten Antwort vor. Er sagt der Maschine also vorab, was ein Fisch, Boot oder eine Robbe ist. Der Algorithmus lernt basierend auf diesen manuell klassifizierten Testdaten und ordnet anschließend neue Bilder der jeweiligen Kategorie zu. Dabei verbessert sich der Algorithmus im Laufe der Zeit stetig. Er lernt selbstadaptiv dazu.

Die Vor- und Nachteile von Deep Learning und maschinellem Lernen

Beim Deep Learning fällt die Vorgabe der Lösung weg, stattdessen wird die Zuordnung automatisiert. Die Maschine erkennt vollkommen eigenständig, ob ein Foto ein Boot, einen Fisch oder eine Robbe zeigt. Die Grundlage für diesen Prozess sind sogenannte künstliche neuronale Netze, welche vom menschlichen Gehirn und den biologischen Prozessen der Informationsverarbeitung inspiriert sind. Stark vereinfacht sind neuronale Netze eine Sammlung von Einheiten die durch Links miteinander verbunden sind und Signale austauschen, ganz wie echte Nervenzellen. In der Regel besteht ein Netzwerk aus mehreren Neuronen-Schichten (Layers), moderne Netzwerke haben bis zu 150 Ebenen.

Es ist erstaunlich, dass neuronale Netze lediglich durch die Kombination mathematischer Funktionen viele verschiedene Dinge lernen können. Es sind außerdem verschiedene Arten von Eingabe-Features möglich. Das ermöglicht im Rahmen der maschinellen Übersetzung nicht nur das Lernen durch Wörter, sondern auch durch Worteinheiten, linguistische Merkmale oder sogar Begriffe aus anderen Sprachen.

Es gibt viele verschiedene Architekturen für künstliche neuronale Netze und das ist faszinierend. Man muss erwähnen, dass oft unklar ist, was wirklich in einem neuronalen Netz passiert. Daher ist es schwer, Übersetzungsfehler zu analysieren und zu verstehen.

In den letzten Jahren wurden Verbesserungen, die durch neuronale Netzwerke ermöglicht wurden, von einer übertriebenen Berichterstattung in den Medien begleitet.

Einige Berichte deuteten an, dass verschiedene Berufe, einschließlich der des Übersetzers, gefährdet sein könnten. Solche Aussagen, die darauf hindeuten, dass die maschinelle Übersetzung das Niveau der menschlichen Übersetzung erreicht hat, sind sowohl für Benutzer als auch für MT-Entwickler schädlich. Es ist wichtig zu wissen, dass MT kein gelöstes Problem ist. Und das wird es auch nicht in naher Zukunft sein.

COMPUTERWISSENSCHAFTEN HEUTE UND IN DER ZUKUNFT

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Oft entsteht die Frage, was Computerwissenschaften wirklich sind. Jeder weiß, dass die letzten heute sehr beliebt sind. Es gibt immer mehr Leute, die Programmierung studieren möchten. Aber es ist oft schwierig, den Begriff „Computerwissenschaften“ zu definieren. Möglicherweise ist die Verwendung des nicht so gut passenden Titels “Computer” der Grund dafür. Es geht dabei nicht nur darum, Computer zu lernen. Obwohl die Computer in der Informatik eine wichtige unterstützende Rolle spielen, sind sie immer noch nur Werkzeuge. Informatik ist eine Wissenschaft, die sehr nah an der Mathematik steht und sich mit Theorien rund um die Speicherung, Verarbeitung und Übertragung von Informationen befasst. Die Wissenschaft muss sich dabei noch nicht einmal zwangsweise um Computer drehen - schließlich sind auch mit dem Kugelschreiber geschriebene Texte auf Papier "Informationen".

In dieser Arbeit wurde die Geschichte der Computerwissenschaften präsentiert, weil viele Leute denken, dass Informatik nur im 20. Jahrhundert geboren ist. Mein Ziel ist auch zu erklären, was zu Computerwissenschaften gehört und warum all das wichtig ist. Programmierung, Computer- grafik, Robotik, Künstliche Intelligenz und Computertechnik sind Bestandteile der Computerwissenschaften.

Programmierung ist der Prozess der Erstellung von Computerprogrammen. Robotik ist angewandte Wissenschaft, in der sich die Entwicklung automatisierter technischer Systeme vollzieht. Sie ist die wichtigste technische Basis für die Entwicklung der

Produktion. Computer- grafik ist Tätigkeitsbereich, in dem Computertechnologien zur Erstellung von Bildern sowie zur Verarbeitung visueller Informationen verwendet werden. Computertechnik ist die Disziplin, die Informatik und Elektrotechnik kombiniert. Dieses Engineering konzentriert sich nicht nur auf der Arbeit von Computersystemen, sondern auch auf deren Integration. Künstliche Intelligenz ist ein Bereich der Informatik, in dem intelligente Computersysteme entwickelt werden, die wir traditionell mit dem menschlichen Verstand verbinden - Sprachverstehen, Lernen, Fähigkeit zu verstehen, Probleme zu lösen usw. In Zukunft kann Künstliche Intelligenz viele Bereiche der Programmierung zerstören.

2017 betrug das Volumen des IT-Marktes 3,5 Billionen US-Dollar und wächst jedes Jahr weiter. Heute nimmt der Bereich der Computertechnik den größten Teil der Weltwirtschaft ein. Immer mehr Menschen erhalten eine Ausbildung im IT-Bereich. Der IT-Bereich wird zunehmend in andere Bereichen eingeführt. Heute entstehen neue wissenschaftliche Branchen an der Schnittstelle von IT und anderen Bereichen. Zum Beispiel, Bioengineering, Gentechnik und so weiter.

Heute gibt es so viele Technologien, dass Sie selbst entscheiden müssen, welche nützlich sind und welche nicht. Es gibt so viele “Interruptive Technologies“, die in unser Leben stürzen. Aber alles ist nicht so schlecht, und viele Technologien helfen den Menschen bei ihren Aufgaben.

KÜNSTLICHE INTELLIGENZ

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Künstliche Intelligenz (KI) bedeutet, dass ein Computer Aufgaben löst, die sonst nur durch einen Menschen bewältigt werden können: etwa Schach spielen oder Daten auswerten und interpretieren. Die Maschine kopiert menschliches oder rationales Denken und Verhalten, basierend auf z.B. Logik.

Künstliche Intelligenz ist ein universales Fachgebiet, welches mehrere andere Themen berührt: Psychologie, Mathematik, Biologie, Linguistik, Wirtschaft und sogar Philosophie. Kein Wunder also, dass es ebenso zahlreiche Ansätze zur Begriffserklärung gibt. Marvin Minsky, ein Pionier der KI, nannte Intelligenz in diesem Zusammenhang ein Kofferwort. Begriffe, mit denen wir viele Dinge meinen, so dass wir abgekürzt über komplexe Fragen sprechen können.

Grundsätzlich wird starke und schwache Künstliche Intelligenz unterschieden. Schwache KI (engl. narrow AI) bezeichnet maschinenbasierte Systeme, die gestaltet wurden, um ein spezielles Problem zu lösen. Dazu zählen etwa die Bild- oder Spracherkennung auf der Pinterest Lens oder Google Home basieren. Starke KI (engl. general AI) bezeichnet die Fähigkeit von Maschinen, eigenständig verschiedene Probleme oder Aufgaben zu lösen – ganz wie ein Mensch. Diese Form der KI wird aktuell erforscht. Experten gehen jedoch davon aus, dass es Jahrzehnte dauern wird, bis starke KI einsatzfähig ist.

Stellen wir vor, es gibt ein neues Spiel, das wir spielen möchten. Aber die Anleitung ist nur auf Englisch verfügbar und wir verstehen sie nicht. Es wäre toll, sie auf Deutsch zu haben, oder? Aber niemand von deinen Freunden spricht Englisch, nur dein Englischlehrer könnte den Text mit Sicherheit übersetzen. Leider hat dieser keine Zeit, denn das Übersetzen all dieser Anweisungen dauert sehr lange. Es wäre also großartig, wenn ein Computer einspringen könnte, oder? Es ist möglich! Wir nennen das „maschinelle Übersetzung", weil es keine Person ist, die von einer Sprache in eine andere übersetzt, sondern eine Maschine. Der Computer kann das zwar noch nicht so perfekt wie dein Englischlehrer, aber es würde ausreichen, um die Spielanleitung zu verstehen.

Wir nennen das „maschinelle Übersetzung", weil es keine Person ist, die von einer Sprache in eine andere übersetzt, sondern eine Maschine. Der Computer kann das zwar noch nicht so perfekt wie dein Englischlehrer, aber es würde ausreichen, um die Spielanleitung zu verstehen.

Die Stärken einer Maschine liegen in der Schnelligkeit und der leichten Verfügbarkeit von Online-Tools. Jeder kann in Sekunden auf eine maschinelle Übersetzung im Web zugreifen. Die Qualität dieser Translationen hat sich in den letzten

Jahren deutlich erhöht. Es gibt inzwischen gute Optionen, bei denen Fehler toleriert werden können. Möchte ein Nutzer etwa einen Nachrichtenartikel *verstehen* oder etwas im Web in einer anderen Sprache finden, dann sind die Grammatik oder der Stil nicht so relevant. Auch wenn die Bedeutung des Originaltextes nicht vollständig übertragen wird, hat dies meistens keine ernsthaften Konsequenzen. Maschinelle Übersetzungen sind also ein gutes Hilfsmittel, wenn ein Text nicht perfekt sein muss.

Außerdem kann eine maschinelle Übersetzung die Grundlage für eine professionelle, menschliche Translation sein. Ich möchte jedoch hinzufügen, dass viele professionelle Übersetzer dem nicht zustimmen würden. Sie sind oft verpflichtet, maschinelle Übersetzungen zu nutzen, um den Arbeitsaufwand und damit die Kosten zu minimieren. Ihre Einstellung zu MT ist positiver, wenn sie wählen können, was und wie viel sie nachbearbeiten möchten.

Es gibt jedoch auch klare Schwächen. Obwohl sich maschinelle Übersetzungen in den letzten Jahren stark verbessert haben, sind selbst die besten Systeme immer noch fehleranfällig und können den Menschen nicht vollständig ersetzen. Es ist daher nicht empfehlenswert, MT für „ernsthafte“ Texte – etwa Auswertungen oder juristische Dokumente – zu verwenden und auf menschliche Beteiligung zu verzichten.

Alles in allem hängt der Grad des menschlichen Eingreifens, der für eine bestimmte Übersetzungsaufgabe erforderlich ist, vom Zweck der Übersetzung und dem Wert des Inhalts ab.

Zur alltäglichen Verwendung empfiehlt man

- Google Translate (unterstützt eine große Anzahl von Sprachpaaren),
- DeepL (Englisch, Deutsch, Französisch, Spanisch, Italienisch, Niederländisch, Polnisch)

Für die Übersetzung großer Textmengen eignet sich Amazon Translate (Arabisch, Chinesisch, Französisch, Deutsch, Portugiesisch, Spanisch, Japanisch, Russisch, traditionelles Chinesisch, Italienisch, Türkisch, Tschechisch)

Und für das Training eigener Systeme für gewünschte Sprachpaare und Domänen, basierend auf eigenen Daten: Sockeye (https://github.com/awslabs/sockeye)

EUPHEMISIERUNG IM POLITISCHEN DISKURS

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Politische Aktivitäten nehmen einen wichtigen Platz im Leben der Gesellschaft ein. Es ist wichtig, dass die politischen EntscheidungsträgerInnen ihre eigenen Positionen, die Situation im Lande und weitere Entwicklungsperspektiven überzeugend präsentieren können. Eine solche Präsentation erfolgt meist durch Reden, Debatten und Aufrufe sowohl an die internationale Gemeinschaft als auch an die StaatsbürgerInnen.

Unter **'Politik'** versteht man vor allem „Lenkung des Staates" bzw. die „Durchsetzung bestimmter Ziele im staatlichen Bereich und die Gestaltung des öffentlichen Lebens durch Individuen, Gruppen, Organisationen, Parteien, Klassen, Parlamente und Regierungen" [3:33]. Politisches Reden gewinnt in diesem Zusammenhang immer mehr an Bedeutung, indem es in verschiedenen Politikbereichen stattfindet, die viele Aspekte des gesellschaftlichen Lebens abdecken können: Innen-, Außen-, Wirtschafts-, Kultur-, Bildungspolitik, Gesetzgebung, Tätigkeit der Regierung, Parteiprogramme, Wahlkampf und Debatten. Bei Dieckmann [1:47ff.] handelt es sich um unterschiedliche Auffassungen der politischen Sprache, wobei man darunter einerseits die Anwendung der Sprache in der Politik versteht, andererseits steht der spezielle politische Wortschatz im Fokus. Dabei fällt auf, dass gerade diese zweite Sicht nicht unproblematisch ist, aus dem Grund, dass man die politische Sprache kaum auf lediglich Wortschatzperspektive reduzieren kann. In den Politikerreden tauchen nicht nur mehrere politische Fachwörter auf, sondern man bedient sich mehrerer Diskursstrategien zum Klarmachen seiner Position und zur Durchsetzung seiner Interessen. Daher wäre es angebracht, eher vom politischen Reden zu sprechen.

Politisches Reden wird mit dem politischen Diskurs gleichgestellt, wobei man die Janusköpfigkeit jedes Diskurses berücksichtigen muss: Diskurs als Prozess (politisches Reden) und Diskurs als Ergebnis (Text der politischen Rede).

Eine der wirkenden Strategien im politischen Diskurs ist Euphemisierung. Darunter verstehen wir eine verschönende Verbalisierungsweise für die als negativ wahrgenommenen Inhalte, die zudem oft tabuisiert werden.

In der Geschichte der Entwicklung einer Sprache entstehen ständig Tabus, die einen „Teil der Verhaltensmuster einer Kultur bilden"; „Existenz und Wirkung von Tabus scheinen in Geschichte und Gegenwart der unterschiedlichsten Kulturen universal zu sein" [2:91– 98]. Der Ursprung des Wortes **Tabu** ist in Polynesien zu suchen. James Cook war es, dem wir das Mitbringen dieses Wortes nach Europa verdanken.

Zöllner [3:17] bringt Tabu in Verbindung mit dem Phänomen des genau Markierten zusammen, dazu zählten konkrete heilige oder magische Dinge, die man nicht berühren sollte. Später kam es zur Unterscheidung der Dinge, die man nicht tun durfte, von Dingen, die man nicht sagen durfte. Es geht hier um non-verbale und verbale Tabus. Dabei kann bei den letzteren zum einen ein bestimmter Sachverhalt tabuisiert werden, also Thema, zum anderen aber auch konkrete lexikalische Einheiten. Die häufigsten Tabus betreffen solche Themenbereiche wie Tod, Sexualität, Gewalt, Geld u.a. Es gibt keine vollständige Liste der Tabus einer Gesellschaft.

Politisches Reden bietet einen fruchtbaren Boden fürs Umgehen für verbale Tabus, vor allem durch die euphemistische Darstellungsweise. Mit Hilfe von Euphemismen gelingt es den PolitikerInnen, tabuisierte Sachverhalte aufzufangen. Um einige Beispiele zu nennen: *ATO* oder *OOS* statt *Krieg*, *Kontaktlinie* statt *Front*, *Nichteinhalten der Waffenruhe* und *unvollständige Umsetzung der Minsker Vereinbarungen* statt *Fortsetzung der Kriegsführung*.

Summa summarum lässt sich sagen, dass Euphemisierung eine effektive Strategie im politischen Diskurs ist, um über peinliche oder negative Inhalte zu reden, ohne Gesichtsverlust oder Verletzung der Konventionen.

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SCHWIERIGKEITEN BEI DER ÜBERSETZUNG VON TECHNISCHEN TEXTEN

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Die Übersetzung ist selbst ziemlich kompliziert. Die Übersetzer müssen die Gedanken und den Hauptpunkt des Textes nicht nur korrekt vermitteln, sondern auch diesen Text zu der Sprache der Übersetzung adaptieren. Der Übersetzer von technischen Texten steht sogar vor noch mehr Herausforderungen.

Unter Übersetzungen von technischen Texten versteht man zuerst normalerweise Übersetzungen von Gebrauchsanleitungen, Benutzerhandbüchern, Leitfaden für verschiedene Waren, Geräte und Systeme, Installation und den Einsatz von Anlagen. Dazu gehören auch Übersetzungen von technischen Spezifikationen, Regelwerken und Normen, technischen Dokumentationen, Literatur, wissenschaftlichen Artikeln usw. Die Besonderheit dieser Übersetzungsart besteht darin, dass in technischen Texten ***zahlreiche tiefenspezialisierte und in der Alltagssprache kaum gebräuchliche Fachwörter enthalten sind***. Die Herausforderung liegt darin, dass der Übersetzer es selbst nie weißt ob das gewählte Wort dem Text passt. Ich persönlich stehe so oft vor diesem Problem. Ich muss nicht nur den technischen Text verstehen, sowie ihn korrekt mit der Hilfe der Wörter, die ich noch nie benutzt habe, zu übersetzen.

Zweitestens, ein technischer ***Übersetzer soll in allem die Terminologie des entsprechenden Fachgebietes praktisch „zu Hause sein".*** Nicht unwichtig ist dabei die Aufgabe, alle Fachterminologie so wiederzugeben, dass sie einerseits dem Originaltext entsprechen und dass andererseits die Übersetzung aus technischer Sicht korrekt bleibt sowie bei Spezialisten einwandfrei ankommt. Aber dies erfordert jedoch der Hilfe des

Fachmanns in dem Bereich, aus dem die Übersetzung kommt und vielleicht eine langjährige Erfahrung des Übersetzers in einem bestimmten Bereich.

Ein ***gut entwickeltes logisches Denken und wenigstens Grundkenntnisse der wichtigsten technischen Disziplinen*** bilden das Set von unentbehrlichen Voraussetzungen für eine qualitativ hochwertige technische Übersetzung.

An dieser Stelle entsteht eine zusätzliche Schwierigkeit: Der Einsatz von Wörterbüchern und Nachschlagewerken kann für den Übersetzer nicht immer hilfreich sein, denn ***ein und dasselbe Fachwort hat häufig eine Mehrzahl von verschiedenen Übersetzungsmöglichkeiten***. Zum Beispiel das Word „Leitung" hat völlig andere Bedeutungen je nach Kontext. Es kann als Draht, Reifen, sowie Kommunikationskanal, Management, Verwaltung übersetzt wird.

Um mit dieser Herausforderung fertig werden, arbeiten die Übersetzer mit den Leute zusammen, die im benötigten Bereich tätig sind. Ich habe bereits die Erfahrung mit der Übersetzung von Texten der Informationstechnologie. So, bei dem Start sprach ich so viel mit meinen Kollegen, die genau wissen, wie man die einzelnen Wörter richtig übersetzt.

Außerdem, die technische Übersetzung setzt im Gegensatz zur literarischen Übersetzung eine Arbeit mit der Dokumentation voraus, die nicht von einem Meister der Sprache oder einem professionellen Linguist verfasst wurde, sondern von einem Ingenieur oder einem anderen technischen Fachmann. Aus diesem Grund ***stößt der technische Übersetzer häufig auf unverständliche, grammatisch oder sprachlich verkehrt formulierte Sätze oder gar ganze Absätze***. Einerseits liegt dies in der Natur des Berufes, weil die Beherrschung eines technischen Fachgebietes keine linguistische Gewandtheit voraussetzt. Andererseits macht es die Aufgabe des Übersetzers nicht leichter.

Die letzte, aber nicht weniger wichtige Herausforderung ist die Tatsache, dass technischer Text muss nachdem Übersetzung technisch bleibt. Weit verbreitet sind hier passive und unpersönliche Konstruktionen. Deshalb kann ein technischer Text etwas trocken und emotionslos klingen, deshalb nicht so attraktiver für Übersetzer erscheint.

DIE NEUEN TECHNOLOGIEN IN DER ÜBERSETZUNG. CROWDSOURCING

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Da das Web dazu beiträgt, die Welt kleiner zu machen, ist der Bedarf an Übersetzungsdienstleistungen dramatisch gestiegen. Die Übersetzungsbranche wurde 2013 auf 34 Milliarden US-Dollar pro Jahr geschätzt und ist in den letzten vier Jahren um 20% pro Jahr gewachsen.

Webunternehmen konkurrieren auf einem globalen Markt und die Vernachlässigung der Expansion in internationale Märkte kann zu Nachahmern und wettbewerbsorientierten Herausforderungen führen. Daher müssen Unternehmen lokalisierte Versionen ihrer Dienste bereitstellen und mit ihren Kunden in den Landessprachen per E-Mail, in Blogs, Foren und Wikis interagieren. Aber die Internationalisierung kann ein kostspieliger und langwieriger Prozess sein, vor allem, wenn die einzige Möglichkeit darin besteht, Mitarbeiter einzustellen, die mehrere Sprachen sprechen oder 0,10 oder 0,20 Dollar pro übersetztem Wort zu zahlen.

Die Übersetzungsbranche ist reif für Störungen, und zahlreiche innovative Übersetzungsmodelle, darunter die Crowd Translation, stellen den traditionellen Übersetzungsansatz in Frage.

Crowd Translation ermöglicht es, große Projekte in kleinere Segmente zu unterteilen und an eine große Gruppe von Personen zu verteilen, die die Übersetzung erstellen. Es hat sowohl seine Vor- als auch seine Nachteile.

Vorteile

Crowdsourcing Übersetzungen gelten aufgrund ihrer dreifachen Vorteile als sehr effizient:

Mehrsprachige Unterstützung

Durch menschliche oder manuelle Übersetzung gibt es keine Grenzen oder Einschränkungen für die Sprachen oder Dialekte, in die der Quelltext übersetzt werden kann. Durch Crowdsourcing bietet die Schaffung einer großen Basis von Übersetzern mit

einer Vielzahl von Muttersprachen die Möglichkeit, den Originaltext in viele verschiedene Sprachen zu übersetzen.

Schnelle Lösung

Wird der Text als Open Source eingereicht, kann die Zeit, in der er übersetzt wird, innerhalb weniger Minuten liegen (wenn der betreffende Text relativ klein ist). Dies ist auf die große Anzahl von Personen zurückzuführen, die Zugriff auf die Aufgabe haben. Trotz unterschiedlicher Kompetenzniveaus der Benutzer wird in der Regel eine genaue Übersetzung erreicht, da die Anzahl der Teilnehmer schier unüberschaubar ist und Fehler korrigieren und überstimmen kann. Allerdings wäre es schwierig, die Kommunikation zwischen einer großen Anzahl von Menschen effektiv zu koordinieren.

Geldpolitische Vorteile

Das Unternehmen, das das Crowdsourcing implementiert, gilt als Hauptnutznießer, da die Kosten für die Wartung einer Crowdsourcing-Plattform nach ihrer Einrichtung niedrig sind. Übersetzer auf Open-Source-Basis gelten in der Regel nicht als Freiberufler oder professionelle Übersetzer, sondern als Hobbyübersetzer, die bereit sind, kostenlos zu übersetzen.

Herausforderungen

Technologische Grenzen

Crowdsourcing ist in der Regel nur dann in vollem Umfang wirksam, wenn es im Internet eingesetzt wird. Damit sind Gruppen von Menschen, die nicht internetfähig oder auch ohne freien, zuverlässigen Zugang zum Internet sind, beim Crowdsourcing unterrepräsentiert. Daher könnten valide und vielleicht wichtige Dialekte in den Ergebnissen weggelassen werden. Zeitzonenschranken spielen auch eine wichtige Rolle bei der Verzögerung der Lieferzeit des Endprodukts und sollten berücksichtigt werden.

Qualität

Die Forschung speziell zur Qualität von Wikipedia "kam zu dem Schluss, dass das Hinzufügen weiterer Redakteure zu einem Artikel die Qualität der Artikel nur dann verbessert, wenn sie geeignete Abstimmungstechniken anwenden und schädlich sind, wenn sie es nicht tun". Das wichtigste zu berücksichtigende Problem ist der bereits

erwähnte unprofessionelle Umgang mit den Open-Source-Übersetzern, für die der Text freigegeben wird, was zu etwas unterschiedlichen Ergebnissen führt.

Motivation

Ohne eine Quelle der Motivation ist es fast unmöglich, aus einem Crowdsourcing-Projekt brauchbare Ergebnisse zu erzielen. Es ist wichtig, Interesse und Begeisterung in der Gruppe der Menschen zu wecken, um ihr Engagement für das Projekt aufrechtzuerhalten. Daher werden oft Belohnungen für die besten Beiträge angeboten.

Kontrolle

Mit zunehmender Bedeutung für ein Projekt nimmt die Fähigkeit zur Kontrolle und Verwaltung der Gruppe ab, was zu einem unorganisierten und chaotischen Ergebnis führt und daher sehr zeitaufwändig und kostspielig sein kann.

- **Ubuntu**

Die Übersetzung dieses Open-Source-Systems, das als Linux-Distribution bekannt ist, wird oft von einzelnen Benutzern durchgeführt, die es in ihrer Muttersprache verwenden möchten.

- **Google**

Der Dienst "Google in Ihrer eigenen Sprache" (GIYL) war ein Projekt, das sowohl von Nutzern als auch von Übersetzern übersetzt wurde.

- **Facebook**

Im März 2008 wurde die gesamte Website durch Crowdsourcing innerhalb von 24 Stunden von angeblich über 4.000 Muttersprachlern ins Französische übersetzt.

3D-DRUCK: DIE NEUEN UNGLAUBLICHEN MÖGLICHKEITEN

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Die rasante Entwicklung der 3D-Drucktechnologie lässt heutzutage die Grenzen des Möglichen weiter und ziemlich schnell verschwimmen. Diese Technologie wird manchmal als eine stille industrielle Revolution gesehen, die weiterreichende

Veränderungen mit sich bringt. Deswegen ist das Thema des 3D-Drucks und seine Möglichkeiten das Hauptthema dieser Arbeit.

Unser Ziel ist also die Betrachtung zahlreicher Anwendungen vom 3D- Druck in verschiedenen Industriebereichen sowie in der ganzen Welt als auch in der Ukraine. Dabei stehen einige Vor-und Nachteile dieser Anwendung im Rahmen unserer Forschung im Vordergrund.

Der 3D-Druck ist eine Technologie, mit der man auf Grundlage eines digitalen 3D-Modells physische Objekte Schicht für Schicht erzeugen kann. Heutzutage gibt es viele verschiedene Technologien, wie z.B. Fused Deposition Modelling, Selektives Lasersintern oder Stereolithographie.

So ist es an sich nichts Neues und schon seit den 1980ern in der Industrie im Gebrauch. Das Drucken von Teilen aus Kunststoff oder auch aus Metall war jedoch meist nicht sehr rentabel und äußerst schwer zu realisieren. Doch der technologische Fortschritt auf diesem Gebiet in den letzten Jahren macht die verschiedenen Technologien auf diesem Feld immer interessanter für äußerst komplexe Anwendungen. Diese Technologie bietet eine Möglichkeit, außergewöhnliche Dinge zu schaffen.

Es gibt ziemlich viele Anwendungsbereiche von dreidimensionalen Drucken wie z.B. Mode, Raumfahrt, Wissenschaft, Autoindustrie usw. Einige Beispiele solcher Anwendungen werden in dieser Arbeit präsentiert.

Die 3D-Technologie hat ja ihre Vor-und Nachteile, die auch in unserer Arbeit dargestellt sind. In verschiedenen Bereichen schafft der 3D-Druck völlig neue Möglichkeiten. Bisher undenkbare Konstruktionen werden auf einmal möglich. Die Kosten für 3D-Drucker sind insbesondere in den vergangenen Jahren massiv gesunken. In naher Zukunft laufen weitere Patente für 3D-Druck Verfahren aus, sodass mit einer weiteren Qualitätsverbesserung der angebotenen 3D-Drucker gerechnet werden kann. Heute zeichnet sich der Trend zu vielfältigeren Werkstoffen (Metall, Keramik, sogar Schokolade etc.) und einer Mischung der verschiedenen Materialien in einem einzigen Druckvorgang ab, sodass auch komplexere Gegenstände (wie z.B. eine Zahnbürste) aus dem 3D-Drucker keine Utopie mehr sind. All das ist vorteilig.

Hauptprobleme beim 3D-Druck sind die Materialkosten und Dauern des Druckprozesses. Urheberrecht, Copyright, Patentschutz sind Themen, mit denen häufig der 3D-Druck konfrontiert. Es passiert, weil am meisten 3D-Modelle geistiges Eigentum sind. Laut einer aktuellen Studie ist der 3D-Drucker ein ernstes Gesundheitsrisiko, wenn er in einem Haus verwendet wird. Drucker geben Partikel aus, die denen ähneln, die Zigaretten emittieren. 3D-Drucker benötigen im Vergleich zu herkömmlichem Kunststoffspritzguss 50- bis 100-mal mehr Energie. Dies macht es unmöglich, einen 3D-Drucker im industriellen Maßstab zu verwenden.

Der 3D-Druck ist heute für die Wissenschaft und vor allem die Medizin und andere Lebensbereiche eine hilfreiche Technologie. In der Zukunft kann es noch viele weitere Funktionen übernehmen und auch den Alltag der Menschen revolutionieren. Alle starken Seiten des dreidimensionalen Drucks können für kleine Mengen und eine hochindividuelle Produktion eingesetzt werden. Bevor die Technologie jedoch andere Produktionsprozesse, insbesondere im Bereich der Massenproduktion, ersetzt, wird dies lange dauern.

SOFTWARE ENGINEERING

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Heute können wir uns unser Leben ohne moderne Geräte kaum vorstellen. Dies können Smartphones, Tablets, Fernseher, Kühlschränke, Smart Home-Systeme oder sogar Autos sein. Im Alltag denken die Menschen fast nie an das Arbeitsprinzip dieses oder jenes Dings nach, aber dahinter steht eine ganze Gruppe von Entwicklern, die ein Softwareprodukt mit maximaler Effizienz und Komfort erstellt haben. Heute ist die Zeit der wertvollsten Ressourcen der Menschheit, und daher ist die Entwicklung hochwertiger Software sehr wichtig für unsere Welt. So ist die Tätigkeiten von Softwareentwicklern und deren Bedeutung als das Hauptthema dieser Arbeit anzusehen.

Zunächst ist es wichtig, die grundlegenden Begriffe und Konzepte zu erläutern. Software ist ein Sammelbegriff für Programme und die zugehörigen Daten. Sie kann als

Beiwerk zusätzliche Bestandteile wie z. B. die Softwaredokumentation in der digitalen oder gedruckten Form eines Handbuchs enthalten. Software Engineering ist die Anwendung eines systematischen und messbaren Ansatzes für die Entwicklung, den Betrieb und die Wartung von Software bei der Verwendung von Ingenieursmethoden zur Entwicklung der Software.

Software-Engineering ist definitionsgemäß ein Anwendungsbereich und teilweise ein praktisches Thema. Aber wissenschaftliche Entdeckungen und Wissen sind nicht die Hauptindikatoren für den Erfolg: Software-Ingenieure und Software-Praktiker sind hauptsächlich an der Erfindung und Entwicklung von Softwaresystemen beteiligt, die versuchen, ein bestimmtes Tempo einzuhalten, eine ausreichende Qualität zu gewährleisten. Das Erfolgsmaß ist hier das Volumen der erstellten Konzepte, Methoden und Prozesse, mit denen Entwickler das Problem der Softwareentwicklung lösen können. Neben der Softwareentwicklung und Softwarewartung ist diese Aufgabe durch eine Reihe von Unteraufgaben charakteristisch: Anforderungsanalyse, Spezifikationsentwicklung, Implementierung und Integration.

Was machen Softwareentwickler noch? Sie sind an der Erfindung und Entwicklung von Softwaresystemen beteiligt und daraufhin programmieren sie diese Systeme. Sie programmieren fast alles, was wir in unserem Digitalleben benutzen.

Und was ist Programmierung? Programmierung ist der Prozess der Erstellung von Computerprogrammen.

Programmentwickler sind einfache Ingenieure im Gebiet von Computerwissenschaften. Ihre Hauptziele sind richtige Projektierung eines Programms und auch richtige Erstellung des Programmarchitektur. Es ist nicht so einfach wie es scheint. Man schreibt noch immer neuen Code neben dem alten Code. Deshalb muss ein Programmcode immer sehr verständlich und flexibel sein. Und was wichtig ist, sollte es für einfacher Benutzer keine Schwierigkeiten bei der Interaktion mit dem Programm seien.

Dieser komplexe Beruf – Softwareentwickler- erfordert die ständige Weiterentwicklung, die bestmögliche Nutzung neuer Tools. Bis wir künstliche Intelligenz nicht schaffen werden, wird Software Engineering genug gefragt sein.

Aber da sind auch manche Probleme – Probleme mit der Gesundheit des Software - Ingenieure – Sehschwäche, Rückenprobleme. Je mehr sich digitale Technologien entwickeln, desto mehr Leute arbeitslos werden können.

So können wie also zusammenfassen. Software Engineering ist genug gefragt. Die Menschen, die zu diesem Gebiet gehören, entwickeln digitale Technologien, die unser Leben einfacher machen.

SCIENCE LOOKS AHEAD

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