



Fusing AI and humanity for a better tomorrow

Data scientist **Dr Pavol Bauer** on the reasons why many AI projects fail, three success factors to prevent this, and why Artificial Intelligence needs humanity for us to truly benefit from its potential excellence.

More automation, faster processes, and improved security – all of this is possible with AI. Nevertheless, according to Gartner, 50% of IT managers will struggle to make their AI projects ready for production by 2023.

This isn't surprising to me, as three success factors are critical and often underestimated in AI projects: human expertise, the right choice of data, and its storage, which must be compliant with current data protection guidelines. Even the first aspect raises one critical question: Do I have the right team of data scientists, analysts, and machine-learning engineers to tackle the challenge?

The argument surrounding data often entails unforeseen efforts too, with around 80% of work related to AI projects being invested in data preparation, transformation, and post-processing. Lastly, teams of data scientists often underestimate the challenges that come with porting their solutions into the cloud environment, both from an engi-

neering and legal perspective. Moreover, business aspects are important at this juncture, such as making sure you don't get locked into an environment of specific cloud providers.

Companies like T-Systems ensure that AI systems and their use comply with company values, ethical principles, and social conventions through our available AI guidelines. At T-Systems, we also make sure that any data processing related to AI applications is carried out in European data centers compliant with GDPR, such as our Sovereign Clouds, the Open Telekom Cloud, and Google Sovereign Cloud. It is no coincidence that the company's CTO Max Ahrens is a member of the board for the Gaia-X initiative, which is advocating for an independent European cloud infrastructure.

The creative side of AI

The creative abilities of AI algorithms are typically not a topic of conversation for

customer projects. On the contrary, which is what made the Deutsche Telekom experiment Beethoven X – The AI Project all the more fascinating. In this project, experts used AI to complete Beethoven's 10th symphony, which was then performed at its world premiere by the Beethoven Orchestra in Bonn. I have been particularly curious about the quality of the results and the extent to which AI can support people in music and creativity. How human is artificial intelligence?

The experiment demonstrated that AI cannot exist without people. In fact, the recipe for success is the interaction between humans and technology. AI can only offer added value if it is trained and correctly implemented by human experts. AI can handle lots of data extremely fast, recognize connections, and find errors. But value can only be judged by humans, which shows the limitations of AI. It does not know what feels right. Or does it?



The extent to which AI can support people in tasks that involve creative thinking is something that evinces a lot of interest among experts.

Before delving deeper into the discussion, let's shine some light on what technologies were used to accomplish "Beethoven X". The main workhorse behind the project is an AI technique called "generative AI". In short terms, generative AI allows the creation of completely new and unseen content based on the data it was trained with. This can be content such as images, videos, text, or, as in this case, music. The great thing about it for content creators or creative industry is that it can generate the desired content at a very high quality and speed too.

Popular examples include synthesis of photorealistic images, transfer of drawn sketches into realistic product previews, or generation of marketing booklets and flyers. Moreover, generative AI is still subject to active research, so we may look forward to more stimulating applications to come. For example, just a few weeks ago, Google DeepMind released the "AlphaCode" project, which showed how perfectly functioning source code can be generated from a textual description of the program task.

Despite all of the great developments, it is still important to keep in mind that the "creativity" of generative AI stems solely from the input data that the model was trained with. This means that any output generated by the algorithms will still show a good level of similarity to the input data instead of being a completely new discovery. Perhaps we can say that, luckily, this is a big difference compared to unbounded human creativity. However, several graphical and video artists learned how to be creative "together" with the AI to create new masterpieces, as was demonstrated by Beethoven X.

Can AI decide what's right?

Opinions on AI projects vary a lot. Some people have serious doubts about AI. But is this justified? It depends; but one has to keep in mind that, in successful use cases, human emotional intelligence should always be involved. Therefore, it is hard to imagine that AI could take over the core tasks of caregivers, for example. It can correctly diagnose

the symptoms of a patient if it is provided with the right data, but it doesn't know how to show empathy or observe ethical and moral principles.

This is a pattern that we can generally apply to AI projects. Without people who have comprehensive specialist knowledge of AI, it isn't possible to create and manage a robust AI pipeline at the production level and, moreover, fully understand the context of AI-based results. Expertise is especially important in the scaling of small proof-of-concept projects across company-wide applications.

For a better understanding of AI, new technical developments are coming to the fore—most importantly, a class of tools named "explainable AI". These kinds of techniques can help us to understand what trained black box models are really "thinking". Using these techniques, experts can justify why a certain output of the AI model has been obtained. This is especially critical in sensitive applications where the human operator needs to understand which specific factors triggered the output, such as recommendation systems for treatments in the health domain.

Moreover, explainable AI can help to make clear that the data contains certain "bias", meaning that the data is not an ideal reflection of the information that exists in the real world, where the model will be operated. Bias is especially dangerous when the AI system works on personal information; it is highly recommended that data science experts ensure that the developed system does not discriminate against any users based on gender and age, for example.

What impacts the viability of AI projects?

Recently, it was reported that only 14.6 percent of companies have been able to implement their AI projects into production processes. Are most AI projects

therefore doomed to fail? I don't think so. If you have the right combination of data, technologies, and expertise, you have a high chance of success. AI projects often fail because they don't have these critical elements. In addition, asking the wrong type of questions that generate discrepancies between the AI analysis and business targets or a lack of reproducibility can threaten the success of AI projects.

Furthermore, we can help to overcome engineering hurdles of bringing AI solutions to the cloud. First, ModelArts allows us to make preconfigured AI models available directly from the Open Telekom Cloud. Second, as part of the AI Solution Factory, T-Systems is set to launch the Telekom Data Science Platform in Q2 2022. This will offer all the tools needed for the development and operation of customer-specific AI models—and can be run in the Open Telekom Cloud or cloud-agnostically independent of the cloud provider.

These platforms belong to the class of so-called "Machine Learning Operations", or simply MLOps. How do they help companies or teams of data science



With AI, we can build foundations for a more sustainable future.

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tists to achieve their goals? Because they take the burden of solving complex cloud engineering problems from these teams, which can then focus on what matters most for their job: data analysis and dealing with the model. Moreover, they allow scaling over as many resources as necessary if demand in a production environment shrinks or grows. This is a critical part of AI algorithms as reliable elements of larger production systems.

Lastly, one of the main challenges of AI in production is so-called model monitoring. The platforms help to answer questions such as, “how does my model behave today when I have very different conditions than those in the data when I developed the model?” For computer vision models, this could be caused by change of weather, visibility, or variability in the kind of objects detected in the

model. In such cases, the Telekom Data Science Platform can, for example, just trigger automated “re-training” routines where the model is automatically re-calibrated to the new normal perceived by the system.

Can human intelligence & AI together be a potent force?

Many people still have reservations about artificial intelligence. But AI is already part of our lives and helps us in many places. Every web search, every speech recognition, every image analysis contains AI – it works undetected and helpfully in the background. Sometimes AI is even part of “solutions” that are very close to us: for example, when assisting a medical intervention, such as the implantation of a prosthesis.

AI can add significant value that we would not achieve without it. Even in areas never imagined, such as the completion of musical masterpieces. So one may ask further: how much AI is allowed? Is there a point where it needs human regulation?

Even if this question seems hard to answer, regulations of AI are on their way. The most prominent regulation that will be effective in Germany is the proposed Regulatory Framework by the European Union. When the regulation becomes effective, it will group AI algorithms into different risk categories that then need to undergo different kinds of assessments to prove they don’t negatively affect society. Moreover, AI systems that are categorized in the

highest risk category, containing software that can cause harm to people or carrying out social scoring, will be completely forbidden in the EU.

The timeline for the regulation to become effective is not clear at the moment, but companies that plan to launch their AI-based products in the future have been advised to take precautions and check if they are compliant with the upcoming regulatory framework.

Getting back to my original topic, one thing is clear: if we stick to consistent international rules for AI use, we can create more masterpieces blending humanity and AI, both now and in the future. This is also because, with AI, we can build foundations for a more sustainable future – whether this is through the optimization of industry and economy, more efficient energy management, or even intelligent emissions monitoring. This makes it practically clear that AI has the potential to benefit every human being on this planet. ■

About the author

After graduating as Master of Science in Biomedical/Medical Engineering (2011 in Vienna, Austria), Pavol Bauer researched and earned a PhD in Scientific Computing at the University of Uppsala in Sweden. Until 2019, he was a member of the Neural Networks research group at the German Center for Neurodegenerative Diseases (DZNE) in Bonn, and until 2021 at the Leibniz Institute for Neurobiology in Magdeburg.

In October last year, T-Systems appointed the native Slovakian as Senior Data Scientist. Since then, he has been responsible for the design and implementation of AI-based solutions and the development of cloud-native machine learning operations (MLOps) for the Telekom subsidiary.



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