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ARTIFICIAL INTELLIGENCE HYPE AS INCENTIVE FOR STUDYING MATHEMATICS

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Pupils finishing their primary and high school tend to believe that Mathematics is just a mixture of some basic tools and more complicated, theoretical results with limited application for real world problems. Basic survey among high school students during the open days at AGH UST proved that an absolute majority (around 85%) believe that teaching mathematics is the usual career path for graduates of mathematical courses.

On the other hand, it is really hard to point out a vertical or market where advanced mathematics is not used or not beneficial. This includes medicine (advanced statistics for new drugs analyses, simulations of new drugs creation, etc.), computer science (algorithms, floating point arithmetic, architectures optimization), industry (process control optimization, on-the-fly monitoring algorithms) or traveling (various discrete programming logistics optimizations for best routes with lowest costs, minimal delays, and eventually highest gains. There is, however, one new application that is revolutionizing an increasing number of applications – Artificial Intelligence, and more specifically – Deep Neural Networks.

DNNs are a concept that came to life in 2012 after very successful applica-

tion of a new architecture of neural network for image recognition within ImageNet competition. That started an extreme hype, the famous paper by Alex Krizhevsky has more than 34 000 citations according to Google Scholar. That means literally tens of thousands of years spent in this field by researchers all over the world. The whole AI revolution is possible because of three things:

1. New types of algorithms – reflecting the learning process observed in the human brain.
2. Extremely computationally powerful new hardware (in particular graphical processing units – GPUs).
3. Big data – we store every data now, all the clicks on websites, all the historical transactions, all the results of every investigation, tests, measurements.

Those combined together resulted in endless applications of DNN, e.g., image recognition, speech recognition, autonomous driving, playing games (such as chess, StarCraft, etc.), increasing quality of images, detecting illnesses, analyzing behavior of users or customers, recommendation systems and many others.

What is, however, crucial is that all the methods are simply mixture of mathematical tools under the hood. That being said, it is an extremely useful example to point out to potential students to give a bigger picture on what type of careers are available to them. Also, as the AI frameworks are freely available for everyone, everyone can claim that he is able to use the deep learning. The major difference, highly distinguished by the employers though, is that it is all about the understanding of the mechanisms behind it. Mathematicians, having full understanding of all the techniques used, are in the perfect position not only to use off-the-shelf products but also to tune them for given and desired applications. That requires skills in probability theorem, statistics, numerical analysis, optimization algorithms (with broadly used stochastic gradient descent type of algorithms). Finally, the market of data science is rapidly growing, with expected market size of 275 billion of US dollars in 2023 with CAGR (compound annual growth rate) of 12 %, so there is almost no risk of getting skills that are not relevant or promising for future.

To sum up, I believe that it is crucial to present to students and potential students some real world applications of advanced mathematics. That would lead them to understand why they are learning different fields of mathematics, increase their motivation, and possibly give them a goal to chase, altogether increasing their engagement and dedication for studying mathematics.

СПИСОК ЛИТЕРАТУРЫ

1. Market Research Future, Data Analytics Market Research Report. – Forecast to 2023, May 2018, MRFR/ICT/1157-CRR.