Session work № 2

CURRENT RESEARCH IN THE FIELD OF INFORMATION COMPUTER TECHNOLOGIES

G. Balianov, Junior specialist student
A. Kulyk, junior specialist student
N. Kolisnichenko, teacher of higher category,
teacher-methodologist, language advisor
Berdychiv College of Industry, Economics and Law

COMPUTERS MAY OVERTAKE HUMANS IN INTELLECTUAL ABILITY

What is Artificial Intelligence? According to John McCarthy, one of the "founding fathers" and the person who coined the term of Artificial Intelligence, it is *"the science and engineering of making intelligent machines, especially intelligent computer programs".*

AI is defined as a unique technological product that enables machines to learn, to adapt to new conditions within their application, to perform multi-layered tasks, to predict events and enhance resources of different nature. Nevertheless the examples of applying AI from well-known gaming computers to intelligent robotic systems, are still human-dependent and require deep learning. However, even at the stage of its current progress, AI has a global impact on the life of the whole civilisation, creating new ideas about the future and prospects for the development of cutting-edge technologies.

Computers can take in and process certain kinds of information much faster than people can. They can swirl that data around in their "brains," made of processors, and perform calculations to conjure multiple scenarios at superhuman speeds. For example, the best chess-trained computers can strategize many moves ahead, problem-solving far more deftly than can the best chess-playing humans. Computers learn much more quickly, too, narrowing complex choices to the most optimal ones. Yes, humans also learn from mistakes, but when it comes to tackling the kinds of puzzles computers **excel a**t, we are far more fallible.

For example, in 1997, world chess champion Garry Kasparov played a series of six games in a rematch against the supercomputer Deep Blue. The year before, Kasparov defeated Deep Blue, winning three games to one (with two draws) against the supercomputer. During the rematch, Kasparov won the first game but then began to struggle. When it was all over, Deep Blue claimed the victory with two wins against one with three draws.

Computers enjoy other advantages over people. They have better memories, so they can be fed a large amount of information, and can tap into all of it almost instantaneously. Computers don't require sleep the way humans do, so they can calculate, analyse and perform tasks tirelessly and round the clock. Notwithstanding bugs or susceptibility to power blackouts, computers are simply more accurate at pulling off a broadening range of high-value functions than we are. They're not affected or influenced by emotions, feelings, wants, needs and other factors that often cloud the judgement and intelligence of us mere mortals.

"Today, computers can learn faster than humans, e.g.," IBM's Watson can read and remember all the research on cancer, no human could," says Maital. "With deep learning, Watson can also solve a problem, for example, how to treat a rare form of cancer — and it has done so. So in that sense, computers can be smarter than humans [1]."

Were these losses signs that computers had become smarter than people? It's true that computers can perform calculations at a blistering pace. The Sequoia supercomputer can perform 16.32 quadrillion floating operations every second. How does that compare to the *grey matter* that's in our heads?

Measuring how fast humans can think isn't easy. Creative estimations are the best we can manage. Using visual processing as a starting point, robotics expert Hans Moravec of Carnegie Mellon institute estimated that humans can process about 100 trillion instructions per second (or teraflops). But Chris Westbury, associate professor at the University of Alberta, estimates the brain may be capable of 20 million billion calculations per second, or around 20 petaflops. Westbury bases this estimation on the number of neurons in an average brain and how quickly they can send signals to one another. What's clear is that computer processing speed is at least approaching, if not outpacing, human thought. But are computers smarter?

Currently, computers fall short of possessing intelligence. But will that always be the case?

There's more to intelligence than processing speed. While a supercomputer like the Sequoia can analyse problems and reach a solution faster than humans, it can't adapt and learn the way humans can. Our brains are capable of scrutinising new and unfamiliar situations in a way that computers can't. We can draw upon our past experiences and make inferences about the new situation. We can experiment with different approaches until we find the best way to move forward. Computers aren't capable of doing that - you have to tell a computer what to do.

Humans are also very good at recognizing patterns. While we are making progress in machine pattern recognition, it's mostly on a superficial level. For example, some digital cameras can recognize specific faces and automatically tag

photos of those people as you take pictures. But humans can recognize complex patterns and adapt to them, computers still have trouble doing that.

Could computer scientists build a machine that simulates the way humans think? It's not as easy as it sounds. The human brain is incredibly complex. We still don't have a full understanding of how the brain works. Without this understanding, it's challenging to create a meaningful simulation of the brain.

Maital points to another example of computer intelligence in his article “Will robots soon be smarter than humans?” On February 10, 1996, IBM’s Deep Blue computer defeated world champion Garry Kasparov in the first of a six-game series, going on to eventually win the series a year later — the first computer ever to do so. Was Deep Blue intelligent? Yes and no, says Maital.

“No, because it was simply able to calculate an enormous number of possible chess moves in a fraction of a second,” writes Maital. “Speed is not intelligence. But, yes, because it was able to analyse these chess moves and pick the best one sufficiently well to beat Kasparov[1].”

“From an AI perspective, we can now train computers to perform better than humans in many tasks, for instance some visual recognition tasks,” says Mallick. “These tasks have one thing in common: there is a vast amount of data we can gather to solve these tasks and/or they are repetitive tasks. Any repetitive task that creates a lot of data will eventually be learned by computers [2].”

But experts agree that humans still tower over computers in general intelligence, creativity, and a common-sense knowledge or understanding of the world.

Some people, such as computer scientist Ray Kurzweil and Tesla co-founder Elon Musk, have warned against the potential dangers of AI, envisioning a Terminator-type future in which machines have run amok. We certainly need to keep a handle on artificial intelligence so that we control the machines rather than the other way around. But the question seems less one of Hollywood-style “evil” machines rising up to exterminate puny humans, than of alignment: how do we ensure that machine intelligence that may eventually be utterly beyond our comprehension remains fully aligned with our own?

In conclusion some of this reconsidering how we approach these questions. Rather than obsessing over who is smarter or irrationally fearing the technology, we need to remember that computers and machines are designed to improve our lives, just as IBM’s Watson computer is helping us in the fight against deadly diseases. The trick, as computers become better and better at these and any number of other tasks, is ensuring that “helping us” remains their prime directive.

We are in a dilemma on the subject of artificial intelligence. On the one hand, we live in an age of technological innovation and we are seeing enormous leaps in computational ability every year. On the other, thinking is hard. We suspect we'll have the hardware capable of supporting thought before we crack the software side of the problem. It's probably only a matter of time before machines are actually thinking in a way that's analogous to our own processes. But it's still hard for us to imagine.

We should admit that creating a self-aware computer system is beyond our capabilities right now. It may not even be possible. While we continue to gain understanding in the fields of biology and computer science, we may encounter a fundamental obstacle before we can ever create a self-aware machine. Alternatively, we may come to a point where human and machine intelligence merge, leaving the entire question moot.

REFERENCES

1. https: // science.howstuffworks.com / life/ inside-the-mind/human-brain/computer-intellectual-ability.htm

2. https://time.com/4960778/computers-smarter-than-humans/