

### **THREE TYPES OF ARTIFICIAL INTELLIGENCE**

“Rapid development of human scientific activity is one of modern trends. Every day new technologies rush into in our life. Artificial intelligence (AI) is not just an important topic, but by far the most important aspect of our future,” says Tim Urban, the founder of the popular Web site “Wait but why”, which explains different topics, including AI. Nevertheless, AI is not a recent invention. The first level of AI development is gradually appearing in technologies we use every day. With every coming year these advancements will accelerate and the technology will become more complex, addictive, and ubiquitous. Progress will lead us to creating a new level of AI – Artificial Super Intelligence (ASI), which will surpass capabilities of human intellect.

Ray Kurzweil, a computer scientist, inventor and futurist, suggests that the progress of the entire 20<sup>th</sup> century would have been achieved in only 20 years at the rate of advancement in the year 2000 – in other words, by 2000, the rate of progress was five times faster than the average rate of progress during the 20<sup>th</sup> century. He believes another 20<sup>th</sup> century’s worth of progress happened between 2000 and 2014 and that another 20<sup>th</sup> century’s worth of progress will happen by 2021, in only few years. A couple decades later, he believes, a 20<sup>th</sup> century’s worth of progress will happen multiple times in the same year, and later, in less than one month. All in all, because of the Law of Accelerating Returns, Kurzweil believes that the 21<sup>st</sup> century will achieve 1,000 times the progress of the 20<sup>th</sup> century [1, p. 281].

A typical dystopian futurist movie has one or two individuals or groups fighting for control of the AI. Or we see the AI battling the humans for world domination. But this is not how AI is being integrated into the world today. AI is not in one or two hands, it’s in 1 billion or 2 billion hands. A kid in Africa with a smartphone has more intelligent access to knowledge than the President of the United States had 20 years ago. As AI continues to get smarter, its use will only grow. Virtually everyone’s mental capabilities will be enhanced by it within a decade [2].

There are three levels of artificial intelligence: ANI, AGI and ASI.

ANI (Artificial Narrow Intelligence) – is the first level that can make a decade only in one sphere. For example, there’s AI that can beat the world chess champion in chess, but that’s the only thing it does.

AGI (Artificial General Intelligence) – AI that reaches and then passes the intelligence level of a human, meaning it has the ability to ‘reason, plan, solve problems, think abstractly, comprehend complex ideas, learn quickly, and learn from experience [3, p.13].

ASI (Artificial Super Intelligence) – an intellect that is much smarter than the best human brain in practically every field, including scientific creativity, general wisdom and social skills [4, p.1].

Humans have conquered the lowest caliber of AI-ANI – in many ways, and it’s everywhere:

- Cars are full of ANI systems, from the computer that figures out when the anti-lock brakes kick in to the computer that tunes the parameters of the fuel injection systems.

- Google search is also one large ANI brain with incredibly sophisticated methods for ranking pages and figuring out what to show you in particular. The same goes for Facebook's Newsfeed.

- Email spam filters are equipped with intelligence about how to identify what's spam and what's not, and then it learns and tailors its intelligence to your particular preferences.

- Passenger planes are flown almost entirely by ANI, without the help of humans.

Sophisticated ANI systems are widely used in sectors and industries like military, manufacturing, and finance (algorithmic high-frequency AI traders account for more than half of equity shares traded on US markets) [5].

Artificial General Intelligence (AGI) is an emerging field aimed at development of 'thinking machines'; that is, general-purpose systems with intelligence comparable to that of human mind (and perhaps ultimately well beyond human general intelligence). While this was the original goal of Artificial Intelligence (AI), the mainstream of AI research has turned toward domain-dependent and problem-specific solutions; therefore it has become necessary to use a new name.

People can easily build a computer that can multiply ten-digit numbers in a split second or beat any human in chess. But building one that can look at a dog and answer whether it's a dog or a cat is an incredible difficult task. Why doing complex mathematical operations is easier, than just looking and recognizing an object for computer? Everyone with eyes can recognize everything he or she sees, but it's so hard for human to calculate root of 2587. Well, we can set the machine to perform the same algorithm, but make computer work, like human brain is really hard. Actually, we don't know exactly how our brain works! Hard process of its work formed during years of evolution, even thousands or millions years of evolution. Calculating or building mathematical forecasts is relatively new to humans in terms of biology, so it is harder for us, than analyse what we see.

“When you reach your hand up toward an object, the muscles, tendons, and bones in your shoulder, elbow, and wrist instantly perform a long series of physical operations, in conjunction with your eyes, to allow you to move your hand in a straight line through three dimensions. It seems effortless to you because you have perfected software in your brain for doing it.”[6].

The main problem is creating hardware, which can simulate 100% of the human brain. If an AI system is going to be as intelligent as the brain, it'll need to equal the brain's raw computing capacity.

Ray Kurzweil measured powerful computing capacity. The faster supercomputer in the world is the Chinese Tianhe-2. But it has a very large area, consumes much energy and has a high price. So powerful isn't a problem, problem is cost. Next is that scientist want to create a computer, which will be able to do coding changes into itself and even improve its own architecture.

At some point, we'll have achieved AGI – computers with human-level of general intelligence. But they will not be equal – the thing is AGI with an identical level of

intelligence and computational capacity as a human would still have significant advantages over humans.

- Speed. Even today's usual microprocessors run at 10 million times faster than our neurons.

- Size and storage. Computers can memorize more things in one second than a human can in ten years.

- Reliability and durability. Computer transistors are more accurate than biological neurons, and they're less likely to deteriorate.

- Collective capability. AI isn't biologically constrained to one body, it won't have human cooperation problems, and is able to synchronize and update its own operating system.

Nanotechnology is an idea that comes up “in almost everything you read about the future of AI.” But it can be very dangerous in combination with AI. For example, create replication circuits based on Carbon give a possibility to “copy” the most dangerous development very fast. However, positive or negative sides of using nanotechnologies are something for the future. According to forecasts of Kurzweil technology will become available soon in the 21<sup>st</sup> century [7].

Today AI helps in medicine, ecology, education. “We have the opportunity in the decades ahead to make major strides in addressing the grand challenges of humanity” [8]. So when will we see the first machine with ASI? The survey results on this matter range from 2022 to 20175 [9, p.9].

“Of course, all of the above statistics are speculative, and they're only representative of the median opinion of the AI expert community, but it tells us that a large portion of the people who know the most about this topic would agree that 2060 is a very reasonable estimate for the arrival of potentially world-altering ASI. Only 45 years from now” [10].

“Once ASI exists, any human attempt to constrain it will be unreasonable. We would be thinking on human-level, and the ASI would be thinking on ASI-level. In the same way a monkey couldn't ever figure out how to communicate by phone or wifi and we can, we can't conceive of all the ways an ASI could achieve its goal or expand its reach. It could, let's say, shift its “own electrons around in patterns and create all different kinds of outgoing waves” — but that's just what a human brain can think of – ASI would inevitably come up with something superior [11].

If ASI really does happen this century, and if the outcome of that is really as extreme – and permanent – as most experts think it will be, we have an enormous responsibility on our shoulders. The next million+ years of human lives are all quietly looking at us, hoping as hard as they can hope that we don't mess this up. So with new technologies we can give a chance for a better life, or we can bring all humanity to the unhappy end.

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