Automotive Digital 1: Artificial Intelligence and Machine Learning – AI and ML

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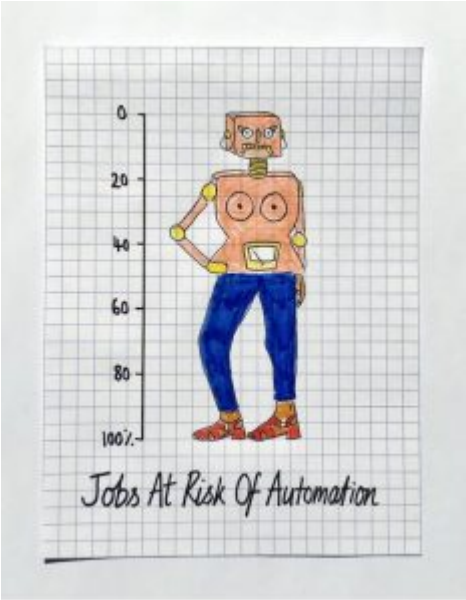
Imagine, your having a conversation. You're asked, "What's your career plan?"



Given all that we know about how jobs are changed by technology, that could be a tough question to answer. New inventions have displaced jobs since work began. In the 20th century tractors replaced horses. Not much new there. One job, walking behind horses, was replaced by another job, driving a tractor around a field. There was still plenty of work to be done. It just had to be completed in a different way.

But today's digital revolution may change jobs much more compared to the earlier disruptions driven by steam and oil. It's not just that the pace is faster and the scope is wider. It's that the new technology may eliminate much work altogether. It doesn't matter whether you're a senior manager or a sales consultant, a finance expert or a diagnostic technician: digital automation will likely affect your job.

One obstacle to predicting how digital tools will effect individuals and their jobs is that they develop so fast. A second is their unfamiliar technology: AI, Machine Learning, Blockchain, Edge Computing and so on. A third is that digital tools created for one industry are transplanted into another in ways that are difficult to foresee. By their nature, digital tools disrupt rather than develop. They facilitate fundamental change, not evolution.

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What is Artificial Intelligence?

Professor John McCarthy from Stanford University invented the term in 1956, so here are his answers. He defined AI as, “the science and engineering of making intelligent machines, especially intelligent computer programmes.” By Intelligence, he meant, “the computational part of the ability to achieve goals in the world. If doing a task requires only calculations and mechanisms that are well understood today, computer programs can give very impressive performances. Such programs should be considered ‘somewhat intelligent’.”

LEVELS OF ARTIFICIAL INTELLIGENCE	
AI Level	Description
1	Narrow or Weak AI, where a machine can complete a narrow range of repetitive task
2	Strong or General AI, where a machine can 'think' and make decisions. This would be the domain of 'emotional intelligence' AI
3	Super AI, where machines surpass human performance. At this level, the machine would be 'self-aware'. There are no Super AI machine at present.

Nowadays, AI refers to the development of computer programmes capable of performing tasks that require human intelligence such as decision-making, object detection, pattern recognition, solving complex problems, forecasting, high level computations and so on. Computers can be programmed to do these tasks with increasing classification and predictive accuracy.

AI has a number of domains or areas of application expertise. Machine Learning, Deep Learning, Robotics, Expert Systems, Fuzzy Logic and Natural Language Processing. Machine Learning and some others are explained below. The rest will be covered in later posts or videos.

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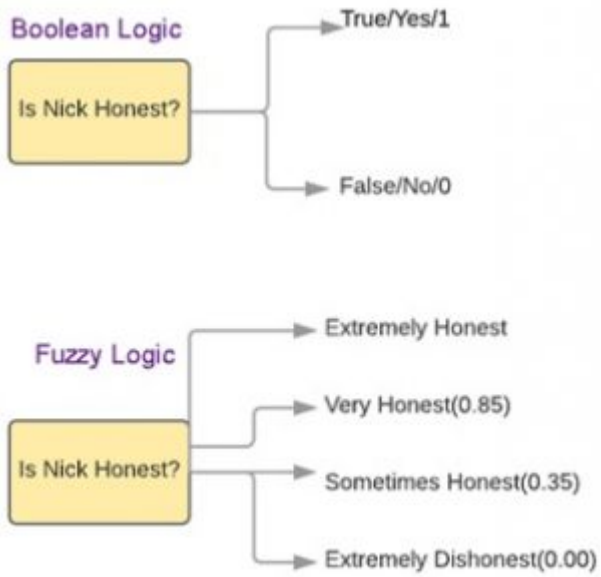
What is Machine Learning?

ML is one of the core tools that create AI. Conceptually, machine learning is the idea, first used by Arthur Samuel, a US computer-gaming pioneer in 1959 that, with the correct software and access to data, computers can learn on their own. But, while the idea was understood 30 years ago, the explosion of interest in ML today was triggered by two developments: first, access to ever-more powerful, low cost computing power; and second, access to the vast data created by the internet, mobile phones and digital transactions. Entrepreneurs realized that they could ‘mine’ that data using sophisticated algorithms to gain insights into consumers and markets which gave them a valuable competitive advantage.



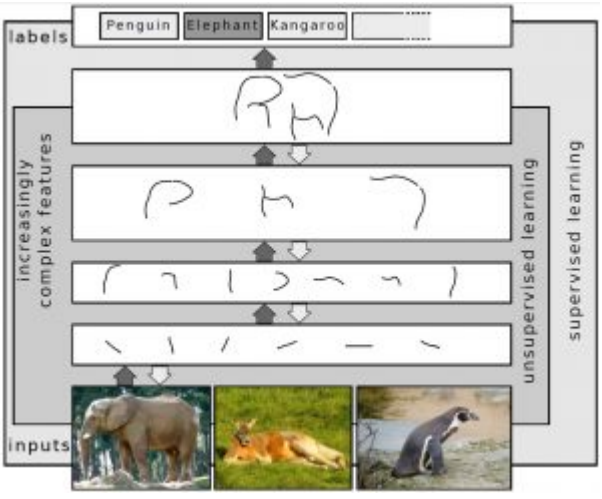
The essence of ML is using programming algorithms to compute and “learn” information directly from data without relying on a predetermined solution. The algorithms adaptively improve their performance as the number of data samples available increases. ML recognises that we humans use two types of ‘logic. They named the new one ‘Fuzzy Logic’. In standard Boolean logic programming something is or is not. In ‘Fuzzy Logic’ situations go from black, through many greys, to white. Fuzzy Logic is used in many automotive control systems, such as automatic gear selection and the application of ABS

Using computers, ML allows humans to solve problems faster, on a larger scale and more accurately than they could ever do before: Forecasting loads for utilities, predictive maintenance for vehicles, scanning crowds using face recognition, credit scoring and DNA sequencing are just a few examples.

Computers can “learn” in two main ways: Supervised and Unsupervised.

In supervised machine learning the programme has a model that makes predictions based on evidence in the presence of uncertainty. Suppose clinicians want to predict whether someone will have a heart attack within a year. They have data on previous patients, including age, weight, height, lifestyle, and blood pressure. They know whether the previous patients had heart attacks within a year. So the problem is combining the existing data into a model that can predict whether a new person will have a heart attack within a year.

In unsupervised learning it’s the computer programmes job to find the hidden patterns and causes from within the data. For example, if a mobile phone company wants optimize the locations where they build mobile phone towers, they can use machine learning to estimate the number of clusters of people relying on their towers. A phone can only talk to one tower at a time, so the programmers use clustering algorithms to design the best placement of cell towers to optimize signal reception for groups, or clusters, of their customers.



In ‘Deep Learning’ both techniques are used together. To distinguish the elephant from the antelope and the penguin, the computer programme distinguishes a rough pattern unsupervised. Once it has an adequate pattern, it compares it to the data base of images and selects elephant. That final stage is supervised learning.

Natural Language Processing is the method for the computer to ‘listen’ to a human speaking and the computer then ‘talking’ back to the human. It’s no easy task for a computer – or even another human to – to fathom meaning in spoken words. Here are the results of a biblical sentence that required translation from English into Russian and back again: “*“The spirit is willing, but the flesh is weak.”* Here is the result when the sentence was translated to Russian and back to English:”*The vodka is good, but the meat is rotten.”*

Motor Industry impacts?

Viable	requires low or moderate level of skill plus human perception	service, warehouse operation
	Large data sets	Investment advice, medical diagnosis, oil exploration
	Expertise can be expressed as rules	Scheduling maintenance operations
Valuable	Workers’ cognitive abilities or training are underutilized	Writing company earnings reports; e-discovery; driving/piloting
	Business process has high labor costs	Health insurance utilization management
	Expertise is scarce; value of improved performance is high	Medical diagnosis; aerial surveillance
Vital	Industry-standard performance requires use of cognitive technologies	Online retail product recommendations
	A service cannot scale relying on human labor alone	Fraud detection
		Media sentiment analytics

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By 2030 there will be an exponential increase in the number of commercial AI-based applications. A study by Deloitte, Cognitive technologies: The real opportunities for business classified AI applications into three broad categories:

Product applications that embed AI in a product or service to provide end-customer benefits. Examples include Amazon’s and Netflix’s recommendation engine and the use of computer vision to improve car safety.

Process applications incorporate AI into workflow to either automate processes or improve them. Automated voice response systems now replace some human customer service agents for first-tier customer support. Train systems use AI to automate and optimize the planning of engineering and maintenance.

Insight applications use advanced analytical capabilities such as ML to uncover insights that can inform operational and strategic decisions across an organization. Intel employs a

predictive algorithm to segment customers into groups with similar needs and buying patterns. It then uses this information to prioritize its sales efforts and tailor promotions. The company expects the approach will generate an additional $20 million in revenue once it is rolled out globally.

Artificial Intelligence and ML do have a lot of promise. They offer automation of mundane tasks and creative insight. Along side many others, the auto industry is already reaping benefits. But, be cautious: AI and ML and other digital tools only offer a future to those who understand them. Traditional managers and point of sales staff that won't adapt, and learn to use them, run the risk of being obsolete. Now is the time to have this discussion. In three to five years it may be too late. So, take a look at Deloitte's 3-V criteria. the closer your work matches them, the more likely it is to be automated

If you're interested to know more, take a look at the next post on **Blockchain and Smart Contracts**.