Overcoming Human Bias with Artificial Intelligence

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Introduction

The science of project planning relies on two key ingredients: human expertise and supporting analytical tools. The inputs provided by human experts (discipline leads, planners, cost estimators and engineers) are really the true building blocks for helping to determine as realistic as possible cost and schedule forecasts on projects that often span multiple years and many hundreds of millions of dollars. While the tools used to help with these forecasts are of course also important, their importance pails into insignificance relative to the mission-critical nature of the human input being accurate and void of bias.

For the past fifty years, the project controls industry has been constrained by availability of such human expertise offering non-biased and objective insight. With the advent of Artificial Intelligence, that is thankfully changing.

Human Bias in Project Controls

Humans use their cognitive (knowing or understanding of a situation) skills to offer expert opinion. This is absolutely applicable when it comes to project planning and controls. The human expert uses historical patterns (prior projects and benchmarks) to help predict the future (the project in question). The chance of introducing bias into this reasoning can be very high.

Wikipedia defines human cognitive bias as "a systematic pattern of deviation from norm or rationality in judgment. Again, relating back to project planning, such a deviation can be caused by many factors including:

- Lack of experience or data points from which to draw reasonable analogies or benchmarks
- Emotional skew towards a desired project outcome (such as desire for the project to finish within a given timescale)
- Political pressure to plan and forecast to a given pre-determined target

How Artificial Intelligence Can Overcome Human Bias

With Artificial Intelligence (AI) and machine learning becoming more mainstream, has also come the ability for computers to assist in eradicating or reducing human bias.

The basic premise of AI is "*the ability for a computer, through understanding of context, to learn from past historical data, thus intelligently putting forward*

suggestions as to future state in a manner that is akin to human expertise". This is achieved through a simple process of:

- Knowledge capture
- Knowledge classification
- Knowledge mining

Firstly, historical project knowledge (as-built schedules, cost estimates and risk registers) is captured. Modern databases support the storing of what is often non-structured data without the need to normalize it down into fixed database tables and fields. Once captured, elements of knowledge need to be classified so that the AI engine can make an informed selection of relevant knowledge during the knowledge mining process (often known as inference).

By having sufficient data points against which to make an inference (e.g. project location, weather conditions, historical productivity rate achievements etc.) the computer is able to make an informed suggestion or critique. The more data points the AI engine has to work with, the stronger the inference and hence, the less chance of bias.

AI engines are getting smarter and smarter in their ability to accurately predict through inference and this is very much the case with regards to Ai within the science of project planning. AI planning tools today are becoming more capable of not only validating plans that have already been put together by the human planner but now able to actually make informed suggestions as to what activities, durations and even sequence of work should be used to develop a project plan.

Can Computers Suffer from Bias as Well?

While computers and AI engines are of course very good at making objective decisions, their ability to be non-biased is still largely dependent on having sufficient data that is actually representative. Having a knowledge library of lots of poorly executed historical projects is likely to result in the computer inferring overly pessimistic suggestions as it knows of nothing else.

This is where machine learning can help. While AI algorithms are very smart, they also require training. Such training can then overcome potential bias. One very interesting avenue of AI development is for the computer to self-adjust based on project planners' adoption or even rejection of AI suggestions. If the computer can determine certain suggestions getting consistently ignored, then it can adjust it's inference engine weightings accordingly resulting in better suggestions being subsequently made the next time around.

The concept of AI engines getting smarter through machine learning and taking on board human acceptance or rejection is a very exciting opportunity for project planning and controls. By the computer being humble enough to know that it's suggestion may be wrong through listening to feedback from the planner, means a

much higher chance that the planner themselves will take on board suggestions from the computer – a self-perpetuating loop of knowledge enrichment.

Can Computers and Humans Work Together in Eradicating Bias?

Human and computer expertise can work together in harmony – the two are synergistic. Computer expertise can be used to guide a human expert when developing a project plan; fill in the gaps where human planner knowledge is lacking and even raise red flags through intelligent benchmarking. Likewise, the computer can learn from the human planner and adjust it's AI algorithm's so as to make better subsequent suggestions.

Taking this bi-directional knowledge flow to the next level, an ideal project planning environment would enable both the computer AI engine and those expert project participants to all give their expert opinion back to the planner during the planning process. The AI engine would provide calibration against historical knowledge and the human experts would then provide validation. Having both a **calibrated and validated** plan would be a ideal scenario that would be difficult to better.

Conclusion

Accurate project forecasting has long suffered from human bias despite our best efforts to capture and leverage historical benchmarks and patterns. AI is without a doubt starting to lessen this human shortcoming resulting in more predictable plans and plans that are more achievable. In the same way that humans can introduce bias, incomplete or misrepresentative data stored in a computer can also lead to machine bias. AI machine learning is the computer's vehicle for overcoming this and the speed at which AI is evolving means that both human and computer bias is rapidly being eradicated resulting in far better project planning and forecasting.