

CHALLENGES OF INTRODUCING ARTIFICIAL INTELLIGENCE IN INDUSTRIAL SETTINGS

Andrew Ng, Computer Science professor at Stanford and one of the leading lights in the field of Artificial Intelligence (AI) has been quoted as saying "Artificial Intelligence is the new electricity". The implication is that this technology will leave almost no industry unchanged and the transformative effects of AI could be felt for decades to come.

AI, machine learning (ML), and more generally 'digitalization', has been occupying space not only in technical publications, but also in the popular press. This includes the scary statistics on the rate at which the new data is being generated, and successes ranging from autonomous cars to voice assistants. It has created a sense of urgency and panic even in industrial enterprises ranging from aviation to oil industry and healthcare to communications that tend to view hardware and services as their key offerings, and data, if any, as almost incidental to their business.

Therefore there is a push in the enterprises across the spectrum to try to figure out how best they can use the new technologies via "digitalization initiatives". The data to be crunched can come from a variety of sources such as sensors, SCADA (Supervisory Control and Data Acquisition) systems, enterprise management software etc. This is the meeting ground - and in some cases battleground - of traditional business and the 'new' disciplines. On one hand are tools, techniques, and people trained in the known ways of doing things, using relatively well understood technologies and methods. On the other hand is the brave new world of "digital technologies" with ever changing acronyms, terminologies, and constant attention in popular press. This poses some fairly non-obvious challenges for implementation of digitalization-oriented initiatives in an industrial enterprise.

At the outset, there is a question of strategy and alignment at the senior management level. Different functions and BUs may take very different view of what needs to be done regarding digitalization initiatives. In absence of a cohesive strategy that is aligned to the business strategy, each function or BU tends to reinvent the wheel and spend money in endless succession of non-scalable PoCs.

Secondly there is a challenge of justifying ROI on such initiatives. Three key things promised by digitalization, namely efficiency improvements, gaining new insights into the data, and

enabling new business models, are not easy to deliver in the time frames demanded by the management.

The third challenge for companies that are not "digital natives" concerns the data. It is usually not digitised and generally not in a format that can be fed directly into the AI/ML models. Sometimes the data is in paper records, with hard to decode annotations / abbreviations, since they were meant to be read by trained humans. Even if it is machine-readable data, it needs to be 'curated'. This can entail huge upfront efforts.

Next, the way the AI/ML models are developed and implemented do not make them a natural fit in the existing workflow process of the internal clients. Packaging the AI/ML models in such a way as to fit seamlessly into the existing workflow can sometimes take more time and effort than development of solutions! Modification of the existing processes can also be expensive and time consuming due to regulatory, safety, or operational requirements.

The fifth challenge revolves around the question of mismatched expertise pools within the organization. The existing workforce, though well versed in the domain, is typically not savvy in the new digital technologies. The new hires, generally young graduates who have acquired proficiency in AI/ML and related areas, lack the domain knowledge of the industry. Not surprisingly, both the groups tend to view each other with a bit of suspicion and sometimes hostility. This can lead to missed opportunities and delays, not to mention heartburn.

And lastly, another recurring issue concerns the the fact that AI/ML models tend to give superior results when the complexity and 'dimensions' of the problem are very large. But training these models for a complex problem also requires large amounts of data that is properly curated. Data collection, labeling, and validation takes time and efforts. (Someone has said 'data scientists spend 80% of their time in preprocessing the data, and the rest 20% complaining about it!'). Also, validating the results in an industrial set-up (on say on a manufacturing line) can be both costly and time consuming.

Above, a few challenges for injecting digitization and more particularly AI/ML initiatives into 'brick-and-mortar' companies are outlined. However, by experimentation and some deft handling of organizational viscosity, some of the challenges can be addressed. First is to ensure that the top management team is aligned and executing a cohesive strategy. Secondly, to have the digitalization teams work closely with the people who have the knowledge of the context, own the data, and actually are looking to have some specific problem solved. Thirdly, the digitalization teams also need to recognize that the legacy data will never be 'clean' and hence should try to develop suitable solutions to address this. AI/ML models that detect and correct anomalies in the input data could be one solution. Next, the analysts also need to fully

understand the the workflow of the internal clients and define their work scope to include the injection of AI models into the workflow as the part of their mission. And finally, the sponsorship of the top management in the initial period till success can be demonstrated is absolutely needed to make a lasting impact.

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