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AI and Cognitive Innovation

By: Praful Krishna

Artificial Intelligence is all the rage right now. Executives across sectors and across parts of value chain are looking to harness its promise and potential. Service Providers are no exception.

However, there is one area where the story is more nuanced – application of AI to natural language. This article talks about the troubles enterprises face using traditional AI technologies for language, and discusses emerging alternatives like Calibrated Quantum Mesh.

The Frustration of a Promise

Many of the algorithms that are popular today have been around for a long time – the first artificial neural networks were developed in the 1960s. It is only now that there is sufficient data being captured digitally to make these algorithms useful, or that there is enough computing power for all this data.

Of all the algorithms based on neural networks, Deep Learning is showing the most promise. It is a technique that involves complex, multi-layered neural networks. It can recognize objects in images and video with greater precision than the human eye, transcribe speech to text faster than a journalist, predict crop yield better than the USDA, and diagnose cancer more accurately than the world's best physicians.

Many players are trying to build solutions based on Deep Learning to automate workflows based on natural language as well. IBM, Microsoft, Nuance, are some of the larger ones. Many others like Amazon, Apple, Google, or Facebook are using similar techniques to power their own products. While there are many successes – who has not asked Siri for a joke and chuckled, if only at its naivete – the business community is getting frustrated.

Take the example of MD Anderson's recent announcement that after investing $62 million over three years, it will discontinue its project with IBM Watson. The project was to automate cancer diagnosis, but failed to give reliable results.

Similarly, independent agents found in February 2017 that 70% chatbot messages on Facebook's Messenger platform gave wrong answers. The company announced significant changes to its platform shortly after that.

The publicized successes of this approach for language are not mainstream. Google uses Deep Learning for its product, Google Translate. This product translates texts in more than 100 languages. The data necessary for such translation is crowd-sourced using Google's enormous reach, for example, using Captcha. Some unconventional methods are also used – two million data points were crowd-sourced for the English to Kazakh translator after Kazakh President's office issued an appeal.

Unfortunately, most enterprises do not have this kind of reach, budgets, or time. They do recognize the potential of such a technology, but are often confused as to the best next steps.

Another source of frustration is the need for annotation. For a Deep Learning system to train, all the training data should be properly marked in terms of its key features. For example, let's say a Deep

Learning system is being trained on a set of tickets raised in some context. Someone needs to go through all the text in each of the tickets and manually mark out the words that indicate the problem, the location, the severity, the urgency, the access level, or any other feature the machine should consider. In many situations qualified subject matter experts are necessary to complete such annotation. This need for annotation increases the costs tremendously. It also makes it very difficult for data scientists to iterate their model, which leads to lower accuracy.

Alternatives to Deep Learning

Automation of workflows based on natural language can be very lucrative to mainstream enterprises if it is more affordable. Technologists in Silicon Valley and around the world are coming up with multiple alternatives to Deep Learning to address its shortcomings.

Frequently, companies focus on a specific application or a vertical to solve the problem in narrow confines. They use venture capital to overcome all barriers enlisted above – collecting sufficient data, annotating them, and training a machine for a specific problem. Such approaches can be relatively successful. However, enterprises or service providers who pride in differentiated solutions do not prefer such solutions.

Others, are inventing fundamentally different algorithms.

The perfect algorithm for English must handle the inherently probabilistic nature of language. Consider the phrase “Good Day”. In San Francisco, it means certain solar insolation, wind-chill factor, humidity, etc. It also implies a temperature of 65 Fahrenheit, give or take. However, if we were to assume the same conditions for South Pole, it probably would be closer to the end of the world than to a good day.

AI meant for English needs to work with such nebulous inputs without human supervision, and still be able to recognize meanings, extract associations, register the various facts, and make intelligent decisions. Such AI should also be able to inter-relate various contextual aspects and habits of users for such decisions. There are multiple other technical criteria that a data science team should use to evaluate these approaches, but perhaps they are out of scope here.

One such algorithm that is being relatively successful is called Calibrated Quantum Mesh (CQM). It is an algorithm meant for natural language and can deal with its various nuances with dexterity. CQM does away with the need for annotated training data leading to a disruptive ROI from cognitive computing projects.

These techniques are called "cognitive" because they focus on the cognitive behavior of a human when he or she engages with natural language or makes decisions based on it. However, in one respect cognitive automation is very different to human capital – it provides much greater scale, running round the clock, at a fraction of the cost of a human resource, without any manual or fatigue-related errors, cognitive bias, or risk.

Three tenets of Calibrated Quantum Mesh:

- In nature, variables do not have absolute values, but they can take various forms (quantum states) at various odds.
- Almost everything is inter-connected to everything else with various levels of influence to form an intricate mesh.
- Patient consideration of all the available information, applied one by one, can calibrate the various odds of the various states such a mesh can take, leading to viable solutions.

The Incredible Potential of Cognitive Automation

Calibrated Quantum Mesh or any other AI algorithms meant for natural language can unlock

significant value for enterprises. Particularly such algorithms can automate complex workflows that service providers deal with routinely. In absence of such cognitive automation they must rely on expensive human solution.

An example of such automation is natural language search (NLS). NLS works as if someone read through all the documents; understood all there was in images, tables or databases; figured out the intent behind a user's question and then answered it with the right snippet – not a document, but the relevant snippet. Service providers use this technique to automate customer facing tasks like support, onboarding or other frequent processes. For example, a European service provider to automotive sector uses this capability to bubble the right knowledge to their customer service agents. It is their response to high attrition in their ranks.

Or consider an industrial major that has wrapped one of its most complicated Standard Operating Procedures within a chatbot. The chatbot educates users about the SOP step by step. It handles all the notifications and approvals from a single interface. In case of process deviations, it can gently nudge the user back to best practices. Repeated use of this chatbot also reveals bottlenecks in the design of the process, so that they can be corrected.

Another use case of cognitive automation is synthesis of actionable insights from a huge amount of free-flowing data. For instance, a large information service provider to an oil and gas major used cognitive automation for a unique use case – creating briefing packets for executives. The solution integrates with executives' calendars, automatically detects the topics of the meetings that are coming up, and then automatically assembles everything important for that meeting from web and internal sources. The briefing pack is delivered directly to the executive, so that they are prepared.

Similarly, extraction of structured knowledge from free-flowing data and classification of information into various buckets (for data security, GDPR, etc.) are popular use cases. In the age of Internet of Things (IoT) service providers are also using cognitive automation to merge data coming in from various sensors. Very frequently such data is not properly labeled and causes a lot of headache for downstream analysts.

The Irony of Cognitive Innovation

Innovation has always been disruptive to incumbent world order. So many powerful companies have been consumed by upstart technologies in history of business. This time, however, cognitive computing is proving to be the strongest ally of the old guard's competitive strength against new players.

Using cognitive computing incumbents can create experiences that are more automated and yet more personalized and more human for their customers. Algorithms can scale infinitely, which also means they can handle a multitude of parameters in making decisions. It follows that each user's journey can be completely personalized.

The key to everything is a willingness to hop on the proverbial band-wagon. Adoption of AI and cognitive automation will be the key driver to separate successful enterprises from average ones in the next decade.