

KEYNOTE ADDRESS

AI-Based Automation in Life Sciences – Keeping Humans in the Loop

10-MIN SUMMARY



TARUN MATHUR

Chief Technology Officer, Indegene

Artificial intelligence (AI) is being applied in pharma in areas from R&D to commercial. Among these, the 4 main categories it is impacting are Customer Experience, Document and Digital Asset Management and Life cycle, Predictive and Prescriptive Analytics, and Process Automation.

For most organizations, digital transformation is a journey from efficiency, through effectiveness to excellence. Efficiency can be improved by optimizing tools and automating manual tasks. The next step is to measure and impact effectiveness to deliver the right information to the right people through the best medium. And excellence means having the right business processes in place to take advantage of the new digital capabilities and seeing the desired ROI.

Among several areas of impact, the content supply chain is one that can benefit a lot from AI. This is possible as it can lower compliance costs, improve the opportunity costs of time to market, help create more efficient and effective content through measuring effectiveness, as well as providing scalability of operations.

In the real world, AI uses a lot of machine learning (ML). These models look for patterns to provide meaningful outputs; they do not have intelligence.

Until they do, businesses must work out ways to handle uncertainties and risks. One way is through human-in-the-loop (HITL) – an approach where AI learns from human expertise and, in turn, human experts' work can become more efficient. HITL is used in developing and training models. Curated data sets are provided by experts and fed into the machine to train it. Then, the machine makes predictions on unseen data and the experts validate its responses.

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While HITL is effective for training, machine-in-the-loop (MITL) is implemented for live business applications. Here, the business process is centered around an expert or human-based workflow and the machines augment the processes.

In one example of the Machine-Assisted Call Center (MACC), HITL and MITL are combined to accelerate data entry in forms. The machine

pre-populates fields and then experts validate the work. The machine learns over time in a continuous feedback loop. Natural language processing (NLP) based chatbots are useful to read and process large volumes of documents. They can be applied to provide answers to medical inquiries 24*7. They take free text queries, read them, and supply a specific response. The machines' responses are refined by human experts to help the machines learn.

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Another area where ML and AI technologies can be leveraged is in Medical Record Reviews to identify and verify claims. The process uses machine vision to read the document, NLP to identify the content of the claims, and classifiers to categorize the information extracted. The machine may make mistakes, but it improves over time as the human expert corrects and augments its results. Even with mistakes, the process is faster and less costly than a fully manual method.

Looking at the effectiveness stage of the journey,

a content performance prediction tool can assess how well a piece of content will engage with an audience. It uses historical data to predict its likely effectiveness. Again, machine vision, NLP, and classifiers are employed. Human training improves accuracy and the benefit is a reduction in re-working of content and, hence, time-saving.

In areas such as asset management, there is a tool that can read content that the enterprise holds and give insights that can be used for repurposing or reusing content, or auditing and planning for a future campaign. It can analyze the material based on readability, tone, and sentiment scores. Machine vision segments and categorizes, then provides the end user with dashboards that give insights into the content. Better digital asset management provides metrics that are meaningful and drives decisions around content and investments.

ML can also be used for commercial content authoring, specifically for template-based emails. The machine learns patterns and makes recommendations based on previous data, with human input to improve the algorithm.

For heavy text-based materials, such as those found in regulatory submissions, an Intelligent Content Management System (ICMS) can provide suggestions for text changes, based on its learned knowledge of previous successful submissions. This reduces time to agency and increases the likelihood of compliance.

One of the most common issues we come across is the need for ways to capitalize on unstructured data, whether these are creative, commercial

assets, or, on the clinical side, patient charts, letters, or provider notes, for example. It is unlikely that there will be enough data available at the beginning of the process to build a structured pipeline and create a useful database for analytics. At the outset, all the materials require human review but, as the machine algorithms improve, this input can be reduced to only 10% over time. As humans can only process about 30% of the unstructured data that AI can, it becomes clear how using machines can accelerate and improve processes.

Classifiers require HITL to improve confidence thresholds. Having a diverse and complete training data set and experts to annotate it can reduce both low confidence scores and the load on the experts.

Subject matter experts (SMEs) are used a lot to test and train the AI systems. This involves collecting and annotating data for the machines' supervised learning. Data is brought in from

crowdsourcing, an enterprise's own private data, and third-party data. Annotation disagreements can be resolved via statistical models. HITL is used to build, test, optimize, and evolve the model over time.

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+1 732 750 2901



digitalsummit@indegene.com



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