

Responsible, Explainable, and Emotional AI

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Artificial intelligence (AI) and machine learning (ML) are members of perhaps the most exciting and important technologies of the last several decades. This special issue of *IT Professional* explores AI and ML from several perspectives including especially those that focus on responsible, explainable and emotional AI, and the unique challenges these areas present to those who build and deploy intelligent systems.

Hopefully, this special issue provides an appreciation for the role that AI and ML play in enabling existing and new business models and processes across all vertical industries. It is helpful to think about “AI” as an umbrella under which a variety of methods, tools, techniques, platforms, and application areas exist—all with their own strengths, weaknesses, and features. In this issue of *IT Professional*, you will find a buffet of discussions about some of most important aspects of the technology, aspects that are not always pleasant to discuss.

This issue begins with some good news about trends toward explainable AI (XAI). Two articles look at XAI: “Explainable Artificial Intelligence for Smart Grid Intrusion Detection Systems” and “Applying Explainable Artificial Intelligence Models for Understanding Depression Among IT Workers.” The trend toward the exposure of algorithms and the models that generate insights, options, and recommendations is enormously important to the acceptance of intelligent applications. XAI enables credibility assessments and for that reason alone will likely remain “required” before intelligent applications are deployed. The reasons for the emphasis on XAI include not only reasons around bias and performance, but also around scalability. If it’s impossible to understand why a system “decides” something, it’s impossible to scale it confidently. It is also necessary to “explain” why decisions are not made. XAI is a trend that will gain momentum

ALSO IN THIS ISSUE

FEATURES

António Trigo et al. report on the positive finding that use of low-code software tools can increase productivity at reduced cost. Their survey article is titled “Low-Code Versus Code-Based Software Development: Which Wins the Productivity Game?” Our second feature article, from Panagiotis Karkazis et al., explains a novel ML approach to prediction of service apportionment that take hardware, virtualization, and application factors into consideration. Their article is titled “Design Challenges on Machine-Learning Enabled Resource Optimization.”

COLUMNS AND DEPARTMENTS

In the C-suite column, Steve Andriole offers the second of three questions that tech-savvy CEOs should pose in “Questions CEOs Should Ask About Digital Technology Meeting #2.” We will not reveal the question here as to not to spoil the impact!

Nir Kshetri, wearing his IT Economics Department hat, explores how the Central African Republic and El Salvador, neither of which have independent monetary controls, have adapted to the use of digital currency in his article, “Bitcoin’s Adoption as Legal Tender: A Tale of Two Developing Countries.”

George Strawn offers serious consideration to the irrepressible role of IT in both the current military and economic cycles in his IT Employment Department article “IT and 21st Century Employment.”

George Hurlburt, contributing to the IT Security Department, raises some concerns over cognitive computing and cognitive security, based upon the current level of understanding of the phenomena of consciousness in “Thinking and Feeling Cognitive Security?”

We recommend these articles for your enlightenment and reading pleasure!

over the next few years. The end result will be XAI capabilities built into every intelligent application.

This special issue then drops to a more detailed level where neural networks are explored in “Sigmoid and Beyond: Algebraic Activation Functions for Artificial Neural Networks Based on Solutions of a Riccati Equation.” The focus on neural networks is important since they are becoming the algorithm of choice for a growing number of applications. In fact, it is arguable that neural networks (especially convolutional neural networks) will become the go-to algorithms for supervised and unsupervised learning applications.

This special issue then turns to misinformation and disinformation, a growing problem in the U.S. and around the world, especially through social media platforms (“Cognitive AI for Mitigation of Misinformation in Online Social Networks”). It then examines the world of deep fakes and how they can be detected (“DeFakePro: Decentralized DeepFake Attacks Detection Using ENF Authentication”).

The focus on misinformation and disinformation is, sadly, as timely as it gets. If the truth be told, some are using AI and ML to create and disseminate misinformation and disinformation and reconfigure truth and objectivity—for profit. This is the dark side of digital that includes cyberwarfare, bot wars, deep fakes, misinformation, and disinformation, among lots of other capabilities that undermine our efforts to deploy technology ethically.

It is fitting that the special issue ends with “Detecting Drift in Deep Learning: A Methodology Primer” and our challenges with data, training, and algorithms. The availability, creation, and quality of data will forever enable (or derail) intelligent applications. The selection of algorithms remains an important step in all systems design and development processes.

Responsible AI is essential to its success. Unfortunately, there are many who see AI and ML as nefarious tools that can be used to make money. The good news is that most technologists see AI and ML as tools to solve many of the problems that have plagued humans

for centuries. AI and ML applications are now diagnosing medical conditions, developing pharmaceutical compounds, and solving some of our most pressing energy challenges. More good than bad, for sure. But vigilance is necessary to keep the ratio positive.

One of the vigilance tools is XAI. If we can “see” what makes algorithms work or fail, we can slow or even prevent the deployment of “evil” applications. Emotional AI is another bell weather. Some applications simulate emotions; some have emotional components. But it is not real—yet. We are some years away from the emulation of human emotions and a larger debate around whether digital systems should emote at all.

We hope you enjoy this special issue. If nothing else, it shines some light on responsible, explainable and emotional AI, a light that needs to shine brighter and brighter as the power of AI and ML grows.

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