Aakarsh Kaushal

Dr. Clark

ENGW 3302

January 26, 2024

Demystifying Machine Learning Algorithms

The complex world of Machine Learning(ML) models and algorithms remains a mystery to most and seems like a ‘black box’ to people outside the field. This essay aims to ‘open’ the ‘black box’ of Machine Learning algorithms using the insights provided by Domingos (2015) in "The Master Algorithm," which serves as a comprehensive entry point into the complexities of machine learning.

Machine Learning is a technology that enables computers to perform actions based on large amounts of data and not require direct specific instructions. Domingos (2015) presents ML as a pivotal force in the digital age, poised to revolutionize various sectors by harnessing the power of data. The success of Machine Learning algorithms is attributed to a confluence of human and non-human actants. Together, they weave a complex tapestry of interdependencies that enables machine learning to thrive and evolve. This collective effort harmonizes the theoretical foundations with practical applications, facilitating a continuous cycle of innovation and improvement.

Human actants involved in Machine Learning encompass a broad spectrum, from researchers who study and invent these algorithms to developers and engineers who implement these algorithms in software and hardware. Collaboration in this field is paramount. The human actants involved in this technology are not only responsible for developing and refining these algorithms but also for shaping the ethical and social norms that govern their use. Another

important human actant is the users. When users use these machine learning models, their data is collected which serves as the basis for training these algorithms.

Non-human actants involved in Machine Learning are algorithms and data. The algorithms are at the core and the center of the field, as they drive complex data analysis to build impressive and real-world applicable models. The large amount of data serves as fuel to these algorithms. Domingos (2015) emphasizes the role of data as the lifeblood of ML, with algorithms evolving in sophistication to extract deeper insights. The computational and technological infrastructure involved is also crucial to allow the models that implement the algorithms to learn from an extremely large dataset.

The dominance of ML is not merely a testament to its technical capabilities but also to the narratives that surround it. Domingos (2015) argues that ML's power derives from its ability to automate decision-making, offering solutions to previously intractable problems. This has led to widespread adoption across industries, from healthcare to finance, transforming how businesses operate and make decisions. Netflix is an example that illustrates a great use of Machine Learning algorithms. Netflix collects data based on what the user’s interests are and then runs complex algorithms in the background to come up with a set of movies or series that might interest the user. The implementation of Machine Learning algorithms has helped Netflix a lot, as it is a great way for user retention.

A slightly more complex but more understandable example of Machine Learning algorithms is the Chat-GPT model made by OpenAI. This software has taken over the world. The capabilities of this software seem endless as it has a response to almost anything that a human can imagine. The core of this model is training algorithms that use large volumes of data to deliver the best responses possible. Chat-GPT uses a more advanced technology that is built

upon Machine Learning. The GPT model uses Artificial Intelligence and neural networks to develop an intelligence of its own and respond to the prompts as if it were an extremely intelligent human.

The term ‘Machine Learning’ was coined by Arthur Samuel in 1959, which is when we witnessed the foundational moment where computers were first programmed to learn from data. The introduction of the perceptron by Frank Rosenblatt in 1957 marks the early exploration of neural networks, setting the stage for future developments in deep learning. The victory of IBM's Deep Blue over chess champion Garry Kasparov in 1997 exemplifies the increasing competence of ML algorithms in specific domains. Finally, the development and open-sourcing of TensorFlow by Google in 2015 opened access to powerful ML tools, catalyzing innovation and application across industries. Each of these milestones peels back a layer of the machine learning ‘black box,’ revealing the intricate interplay of ideas, technologies, and societal needs that propel the field forward. Later, this technology took a new form and shifted more towards Artificial Intelligence. The most impactful result of Machine Learning is the new era of Artificial Intelligence driven primarily by the booming Chat-GPT. This is just the beginning, and the limits of this field are endless.

In conclusion, Machine Learning, as unraveled through Domingos' (2015) "The Master Algorithm," is a complex technology formed by an intricate web of human and non-human actants. Its rise to prominence is marked by both its revolutionary potential and the impact that it has had on the world. By examining the components and forces that drive ML, we can better understand its impact on society and work towards harnessing its power responsibly.

References:

Domingos, P. (2015). The Master Algorithm: How the Quest for the Ultimate Learning Machine Will Remake Our World. Basic Books.