Machine Learning module - reflection

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Introduction

The Machine Learning module has been an experience that allowed me to learn some invaluable skills. We have been given an opportunity to work in teams and

develop a machine learning model. Although the topic of machine learning was not new to me - I am currently employed as a Senior Analytics Engineer at an EdTech company - I quickly realised I lacked many skills and a lot of knowledge necessary to apply machine learning models and principles appropriately.

Previous experiences

I first encountered machine learning back in 2019 when I was starting my professional adventure in the world of data. Back then I was employed at Booking.com and was working as a Junior Safety Analyst. The scope of my responsibilities mostly included supporting the team with monitoring of the reservations that customers placed as well as hotels at which they placed them in order to (ideally proactively, sometimes reactively) combat any kind of safety hazard. Safety hazards could range anywhere from hanging wires at a property all the way up to some abusive behaviour of owners or staff. Because I am bound by confidentiality, I will provide a general overview, which is within the guidelines of what I can share about that position.

We were heavily relying on Natural Language Processing models (Howard and Ruder, 2018) which were written by Machine Learning Engineers. It was my first encounter with the real-world application of machine learning and I did not know much about it, except for the fact that it works, increases team efficiency exponentially and that it needs further training and validation. Apart from benefiting from the work of this model, I was taking part in the validation exercises which helped to train the model and improve its accuracy. This was all of my involvement at this first encounter with machine learning.

Challenges

I was lucky enough to be assigned to the team with Rory, whom I enjoyed working with. Rory was a great team member and we complimented each other in the work delivered. He developed several, gradual improvements to the model he was working on, while I managed to fine tune the final model to some very high accuracy. First challenge arose when we started scheduling the team meetings necessary to complete the team project. It was then when we both had to be flexible, adapt one to another in order to find a time that can work for the both of us. We managed to do that and were ready to progress with the work on the project.

The task at hand was to create a Neural Network model for classification (Picton, 1994). I started with reviewing the literature on the topic in order to understand a little bit better of what it is we are supposed to build. I came across a couple of interesting publications, such as Rumelhart et al., 1986: proving that backpropagation can be used effectively with neural networks or Hinton et al., 2006: analysing a greedy layer-wise training algorithm.

The most interesting aspect of working with neural networks was the fact that they resemble so closely the human brain and neurons (Kufel et al., 2023). It raised several questions about the origins of machine learning and prompted me to review even more literature on the topic of machine learning in general. I learned about Probably Approximately Correct framework (Valiant, 1984), AlphaZero model, used to master games like chess (Silver et al., 2017) and Deep Q-learning algorithm used for AI to play Atari 2600 games (Volodymyr Mnih et al., 2013).

Learning more and more about this tremendous world of possibilities that machine learning provides has opened my mind on the range of applications of machine learning. It triggered several thought processes and prompted me to start a discussion with my friends about some potential interesting projects we could take in our spare time that could benefit the society or at least the industry we are in. To date I have not found enough time to start some serious development which I regret. I have a plan to review this conversation when I complete the MSc Data Science programme.

Learning outcomes

The Machine Learning module has brought several learnings. Most importantly: how to build machine learning algorithms and how to evaluate their performance (Poerner, Roth and Hinrich Schütze, 2018). We were building our model in the Python programming language. It was an experience I have not had before and it proved very useful to be able to consult with Rory, who had some previous machine learning experiences. Rory taught me a structured approach to the development of machine learning algorithms: starting from easier and less complicated ones, then fine tuning parameters and gradually improving the performance until it reaches an acceptable level (Montone, O'Regan and Terekhov, 2017).

The experience of working with Rory on this development has changed the way I approach problems right now. I found it to be very useful learning, which allows me to break down the problem into smaller pieces and work from there. Usually, I would tend to jump into the solution and figure out details as I go. Now, I take much more time and a step back to think about possibilities, details and proper planning.

Conclusion

The Machine Learning module was a great experience overall. I became acquainted with two new machine learning algorithms: XGBoost (Chen and Guestrin, 2016) and Neural Networks (Picton, 1994). I have also benefited from working in one team with Rory, who was of great help when developing the model and changed my approach to problem solving, by introducing gradual and structured improvements to the model he was working on, while I started immediately with the final model that I was simply fine tuning for performance. This module has also prompted me to investigate the realm of machine learning and I am planning, after this MSc programme ends, to start some independent work with my friends on an open-source project that will have some benefits for the society or data industry. I have learned a lot, made a new friend and I feel my horizonts expanded after that module.

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