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Dive Into Deep Learning
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Chapter 1 Exercises (From The Book)

1. For this example I will be discussing an application to perform end-to-end UI testing on an arbitrary e-commerce website.

Some parts of the code I feel could be ‘learned’ might be the way the user navigates the site to checkout and purchase an item. I think with several attempts a machine could learn and simulate this very interaction, as opposed to the current way of doing this which is by assuming the path that the user will most likely take. You might even be able to deploy multiple agents with the goal of purchasing an item and see if any learn to do it different ways on the website.

2. Something that immediately comes to my mind when thinking of a problem that has many examples on how to solve is eating healthy. It’s very simple to pay for an app that gives you custom meal plans that can both fit your dietary needs in addition to being versatile and delicious. It would be really cool to task machine learning with being able to learn that foods you like and don’t like and then developing a meal plan that gives you options and is tasty.

3. Comparing artificial intelligence to the industrial revolution, it is easy to see how our algorithms are like steam engines and data is like coal powering those engines. If I had to think of a fundamental difference between these two ideas I would say that AI actually cares about how good the coal is. Whereas, in the industrial revolution, any coal would suffice. I think back to earlier in the chapter when they made the claim “garbage in, garbage out”. I believe that speaks volumes to the difference between the two and one reason they are fundamentally different.

4. I feel like this is a question to get the reader excited because all facets of these fields can be improved with AI and deep learning! What is so exciting and awesome is that deep learning is so generalizable and abstract. Obviously there are ways that the algorithms as a whole can be improved but in terms of learning the AI doesn’t really care whether it’s learning physics or economics. In that sense it is really versatile and extremely practical in the real world.

Chapter 1 Summary (d2l Study Group Assignment)

In chapter one, you begin to understand just how powerful machine learning can truly be. Whether it be a voice assistant to help you with your daily tasks and routines, or simply a classification model to identify whether something is a hot-dog or not, machine learning will be your go-to tool to accomplish that task. The chapter’s goal was not only to introduce machine

learning to you but also to excite you about the skills you are about to acquire, which is definitely accomplished.

The first few sections of the chapter you are introduced a number of different real-life scenarios to get you thinking about machine learning, such as the way your smart assistant works on your phone. Following up with these scenarios, a very simple and easy to understand flow diagram of how machine learning works is presented. It is clear the chapter's goal is not to intimidate you but to excite you. In addition to introducing a number of key terms and concepts both in ML and Probability and Statistics, the chapter also spends a great deal of time building confidence in the idea that the reader (you) can learn this topic if you put the work in. Which is truly encouraging and inspiring.

After a basic introduction to ML, the chapter then breaks up to give short descriptions about all the different types of machine learning 'styles' out there (Supervised and non-supervised learning). Classification sums up to the idea of identifying objects within data like photos, recordings, and others. You can then tie this into sequencing and tagging to be able to identify multiple objects in images to create a really powerful object detection / avoidance model. Other software tools like Regression can be used to give accurate real-number estimates on row and column data like house sales, book prices, and really anything you can think you might need. And of course we have things like search and recommendation algorithms (Elvis' favorite) for providing accurate and properly prioritized data based on the needs and requests of the user. This is extremely powerful and so much more personalized while maintaining the integrity and privacy of the user (which I believe is super powerful).

The chapter makes clear that while these tools all possess their own powerful abilities, there is a sense to which they are stale models once they have been trained, and that they do not really experience any continued learning once they are pulled out of the training pipeline. This is where reinforcement learning really shines. Being able to create powerful agents that are able to learn on their own with rewards/values is extremely powerful. The chapter discloses numerous success stories between Go, Dota 2, robotics, and numerous other powerful applications where the reinforcement strategy worked extremely well. Pursuing machine learning in order to apply it robotics, I personally am extremely excited about the power and ability of Machine Learning.

Finally the chapter wraps up talking about a few other models such as Generative Adversarial Networks (GANs) that deploy two different machine learning models that fight with each other in order to be able to construct extremely convincing images known as deep fakes. It also lists off even more success stories of machine learning in general to really excite the reader about all the possibilities of ML.

After reading that chapter and interacting with a lot of the other material provided to us I can truly say I feel like the main goal of this section was to excite the student, to which it of course succeeded. I believe getting a good understanding of the road ahead ultimately allows one to travel it much better and help them ultimately understand all the different 'paths' we may take over the course of the next year. Overall, I am really thankful for this chapter and looking forward to all the content that lies in the months ahead.