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**Lab 03 How Neural Networks Learn**

**L03 ITAI 2376**

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**First Example of Neural Networks**

Introduction

In this lab, we explored the process of building an end to end neural network solution to process text data. Key steps included importing and preprocessing the data, creating a neural network with multiple layers, training the model with the text data, validating the model during training and tweaking parameters to improve its performance. The dataset used was the Austin Animal Center Shelter Intakes and Outcomes dataset, with the goal of predicting weather a pet would be adopted. I will provide a reflection on any new insights gained about neural networks and PyTorch, the challenges encountered, and how I might use the concepts learned in future projects.

**Insights & Understanding**

This lab provided new insights into how neural networks can be effectively applied to text data. Working with PyTorch, I gained a deeper understanding of its functionalities and how to leverage its power for building neural networks. One surprising aspect was the flexibility PyTorch offers in terms of customizing the architecture and training processes, which allowed for more tailored and efficient models. The real-world application of predicting pet adoption outcomes provided a tangible example of how neural networks can be utilized in practical scenarios.

**Challenges Encountered**

Throughout the lab, I faced several challenges, particularly with the challenge activity at the end of the lab. I was able to import and install PyTorch and TensorFlow but received the error message "NameError: name 'net' is not defined" which means that the variable net is not defined before calling .apply(xavier\_init\_weights). I put the error message into chat GPT and I gave me a response to rename ‘net’ to ‘model’ once I applied the change I received the same error message "NameError: name 'net' is not defined" occurs because you're referring to net.parameters() when your model variable is actually named model. I asked ChatGPT again for help fixing the error and received the response “Change **net.parameters()** to **model.parameters()** in your optimizer definition:”. I applied the changes and continued to receive error messages until I was finally able to run the code successfully. I will am still planning to explore the challenge lab again to see if I can get a better understanding on how to complete the lab the first time with no errors.

**Application & Relevance**

The concepts learned in this lab are highly relevant to the field of AI, particularly in text processing and predictive modeling. Understanding how to build and train neural networks with text data opens up a host of applications, from sentiment analysis to recommendation systems. In future projects, I envision using these techniques to develop more sophisticated AI models that can handle diverse types of data and provide valuable insights.

**Code and Experimentation**

During the lab, I experimented with different parameters in the neural network, such as the number of hidden layers, learning rate, and batch size. For instance, I tested various learning rates to see their impact on the model's convergence speed and accuracy. I found that a moderate learning rate provided the best balance between training speed and performance. Additionally, I experimented with dropout rates to prevent overfitting, which improved the model's generalization on unseen data.

**References.**

ChatGPT: Promt “ how do I fix this error message”