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### **Lab-05: AWS Machine Learning University Module 2 Lab Exploration**

#### **Introduction**

Throughout this reflective journal I will cover my learning insights, challenges and struggles personal growth and a critical analysis over my experience with AWS module 2 labs 1-4. explore the fundamental machine learning concepts discovered, the technical and conceptual challenges faced, and how my understanding has evolved. Additionally, I will reflect on what I would do differently and how these experiences fit into the broader landscape of machine learning.

#### **Learning Insights**

##### **What fundamental machine learning concepts did you discover?**

In lab 1, I some fundamental machine learning concepts I discovered were the different text processing techniques like word clouds, stemming, lemmatization, part of speech tagging and named entity recognition.

For lab 2, I was able to dive a bit deeper and explored the bag of words method, binary classification, word counts, term frequency (TF), and term frequency inverse document frequency (TF-IDF)

Lab 3 gave me a better understanding of word embeddings, specifically GloVe word vectors and how to use them to capture word meanings and relationships.

In lab 4, I discovered how to use recurrent neural networks (RNNs) for text classification.

##### **How do the labs connect to broader machine learning principles?**

The text processing techniques for lab 1 are foundational for preparing data from machine learning models, making sure they perform better and are more useful.

Lab 2's bag of words method connects to the broader principles of feature extraction and representation learning, which are very important for machine learning.

In lab 3's exploration of word embeddings relates to representation learning and the importance of capturing semantic relationships in data

Lab 4 focused on RNNs connects to the broader principle of using neural networks for sequence data and capturing temporal dependencies in data.

### **Which moments of learning were most impactful for you?**

The moment of learning that were most impactful for me in lab was would be learning about named entity recognition. It was impactful because it highlighted the importance of identifying key entities in text data.

For lab 2 understanding the use of TF-IDF was significant since it showed how to enhance the importance of rare but meaningful words in text data.

Discovering cosine similarity in lab 3 was a bit eye opening because it demonstrated a practical way to compare word vectors and understand their relationships.

Setting up and training an RNN model in lab 4 was a milestone as it showcased the power of neural networks in handling sequential data for text classification.

### **Challenges and Struggles**

#### **What technical or conceptual challenges did you encounter?**

In lab 1, Understanding POS tagging was initially challenging because it requires both linguistic knowledge and technical implementation. One difficulty was grasping how POS taggers use predefined rules and machine learning models to assign tags, especially when words can have multiple meanings depending on context.

Lab 2 was a challenge learning and interpreting TF-IDF values and making sense of all the numbers that were output.

In lab 3, I had a difficult time grasping the concepts of high dimensional word vectors and the applications.

Lastly lab 4's challenge was in understanding how configuration and fine tuning the RNN model for optimal performance actually worked.

#### **How did you approach and overcome these challenges?**

For lab 1 I overcoming this challenge required practice and analyzing the misclassifications, and understanding how training data influences the accuracy of the tagging process.

For Lab 2, I revisited the theoretical concepts behind TF-IDF and practiced calculating it with various datasets.

In Lab 3 I analyzed the code in the lab and used the lessons in AWS to get a better understanding of the vocabulary and what each part means in terms that made more sense to me.

For Lab 4, I iteratively read and reread the code for the RNN model's hyperparameters and used ChatGPT to help me gain a better understanding how it all worked together.

#### **What strategies did you develop for problem-solving?**

Breaking down complex concepts into smaller, manageable parts really helped me gain a better understanding of the things that were initially confusing. Utilizing the lessons inside AWS to get a better understanding of the vocabulary and theory.

## **Personal Growth**

### **How has your understanding of machine learning evolved?**

I think my understanding of machine learning has evolved from basic theory concepts to practical applications since completing the AWS labs. I think I have a better understanding of the context of text data and neural networks in general

### **What surprised you about the learning process?**

I was particularly surprised by Lab 4, where the model underwent 35 epochs and demonstrated impressive accuracy improvements after each cycle. Observing the percentages decrease with each iteration was fascinating. Overall, the process of building and training the RNN model was incredibly intriguing.

### **How might these skills apply to your future academic or professional goals?**

These skills are directly applicable to roles in data science and machine learning, where text processing, feature extraction, and neural networks are frequently used. Understanding these concepts also positions me well for advanced studies and research in machine learning.

## **Critical Reflection**

### **What would you do differently if you could repeat these labs?**

I would allocate more time to thoroughly understand the theoretical concepts before jumping into the practical exercises. I would also document my learning process and challenges more meticulously to track my progress better.

### **What additional questions or areas of exploration have emerged?**

I am curious about building and training models more than anything. I am also interested in exploring the ethical considerations and implications of using machine learning models in real-world applications.

### **How do these labs fit into the broader landscape of machine learning?**

These labs provide a foundational understanding of key techniques and models used in machine learning, particularly for text data. They also highlight the importance of preprocessing, feature extraction, and model evaluation, which are essential components of any machine learning project.