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Lab Module: Application of Deep Learning to Text and Images – Module 2, Labs 1-4

Reflective Journal: A Journey Through NLP in Module 2

Module 2's four labs—Processing Text, Bag-of-Words (BoW), GloVe Word Vectors, and Recurrent Neural Networks (RNNs)—took me on a transformative ride through natural language processing (NLP). As a second-year AI student, I started with basic text handling and ended up training a neural network, each step building on the last. This journal weaves together my learning insights, challenges, personal growth, and critical reflections across these labs, capturing how they've shaped my understanding and ambitions in AI.

Learning Insights

These labs unveiled the layers of NLP, from raw text to predictive models. Lab 1 introduced me to text preprocessing—word clouds highlighted key terms like "language," while stemming and lemmatization showed how to simplify words for analysis. Named entity recognition (NER) was a gem, pulling out "Amazon" as an "ORG" from text, tying directly to ML's need for structured data. Lab 2's BoW method turned text into numbers—binary flags, word counts, and TF-IDF taught me how to quantify language, with TF-IDF's weighting of rare terms being a standout for its elegance.

Lab 3 brought word embeddings with GloVe, and seeing "cat" as a 50-dimensional vector was mind-blowing—cosine similarity comparing "car" to "truck" versus "bike" made semantic relationships tangible. Finally, Lab 4's RNN took it all home, using GloVe embeddings and padded sequences to classify Amazon reviews. Watching loss drop and accuracy climb over 35 epochs was thrilling—it connected preprocessing to prediction, showing how ML learns from sequences. Each lab built on the last, revealing NLP as a pipeline from chaos to insight.

Challenges and Struggles

Every lab had its hurdles. In Lab 1, spaCy's setup gave me dependency headaches—I had to troubleshoot errors methodically, learning patience. Stemming's odd outputs like "messag" stumped me until I grasped its rule-based limits versus lemmatization's finesse. Lab 2's BoW challenge tripped me up—I misapplied transform() and got gibberish until I retraced the vocabulary fit. TF-IDF's formula felt daunting, but tweaking inputs clarified its logic.

Lab 3's GloVe vectors were abstract—50 dimensions for "computer" meant nothing until cosine similarity clicked through experimentation. Lab 4 was the toughest—padding text to 50 tokens threw shape errors, and I wrestled with RNN hidden states until rerunning the diagram made sense of it. My go-to strategy became trial and error: tweak, test, analyze. It's messy, but it turned frustration into breakthroughs.

Personal Growth

My ML understanding has evolved from fuzzy concepts to hands-on mastery. Lab 1 showed me preprocessing as the foundation; Lab 2 made vectorization a bridge to models; Lab 3 added depth with embeddings; and Lab 4 tied it all into a working RNN. I was surprised by how much I loved the process—plotting accuracy curves in Lab 4 or seeing "truck" beat "bike" in Lab 3 felt like cracking codes.

These skills fuel my goals—I'm drawn to NLP for chatbots or sentiment analysis, and now I can preprocess text, vectorize it, embed it, and model it. I'm not just a student anymore; I'm someone who can build AI that understands language. This journey's boosted my confidence, shifting me from "this is cool" to "I can do this."

Critical Reflection

Looking back, I'd approach these labs with more curiosity. In Lab 1, I didn't test stemming on slang—where does it fail? Lab 2 stuck to example sentences; I should've tried noisy data to push BoW's limits. Lab 3's GloVe deserved wilder experiments—how does it handle ambiguity like "bank"? Lab 4's RNN could've used more epochs or GRU layers—I stopped at 35 when 50 might've plateaued better.

Questions linger: How do these methods scale to massive, multilingual datasets? What about sarcasm or bias in embeddings? The progression from BoW to RNNs feels like NLP's

evolution—simple to sophisticated—and the tease of BERT in Lab 4's next step has me buzzing. These labs are foundational, bridging basic ML to cutting-edge tools, and I'm hooked on exploring further.

Conclusion

Module 2 was a whirlwind of code, concepts, and growth. I've wrestled with spaCy errors, decoded TF-IDF, compared word vectors, and trained an RNN—all while morphing from a newbie to someone who sees NLP's bigger picture. These labs handed me a toolkit and a spark; I'm ready to tackle transformers next, dreaming of AI that truly gets humans. It's been a wild ride, and I'm just getting started.