INTERNSHIP REPORT

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Institution: SRM IST, RAMAPURAM
Internship Duration: 21-06-2025 to 21-07-2025
Organization: NullClass Internship

Title: AI-Based Text-to-Image Generation and NLP Embeddings

1. Introduction

This internship at NullClass provided me with a real-world opportunity to implement advanced Natural Language Processing (NLP) and Deep Learning techniques. My tasks were centered around text tokenization, embedding creation, and building a text-to-image generation pipeline using state-of-the-art tools and frameworks.

2. Background

I have a background in Computer Science with a focus on Big Data and Machine Learning. This internship enhanced my hands-on exposure to Transformer models (such as BERT and GPT), Hugging Face Transformers, and Generative Adversarial Networks (GANs), all of which are highly in demand in the field of AI and computer vision.

3. Learning Objectives

Understand and implement text tokenization using pre-trained language models. - Learn how to convert text into embeddings suitable for model input. - Create a text-to-image generation system by combining embedding techniques with GANs. - Gain experience with metrics like precision, recall, and confusion matrix. - Build modular, clean code following modern ML pipeline practices.

4. Activities and Tasks

Task 1: Text Tokenization and Encoding

- Implemented a BERT-based tokenizer using Hugging Face Transformers.
- Converted text into tokens and then into embeddings suitable for NLP-based pipelines.
- Evaluated the quality of tokenization and encoded outputs.

Task 2: Embedding for Text-to-Image Generation

- Used Hugging Face library to generate text embeddings.
- These embeddings serve as input for a downstream text-to-image model.
- Ensured embedding shape compatibility and integrity for GAN input.

Task 3: Full Text-to-Image Pipeline

- Designed and implemented a GAN-based model.
- Integrated previous tasks: text preprocessing, embeddings, and image generation.
- Validated performance and generated sample images based on given text prompts.

5. Skills and Competencies Developed

NLP (Natural Language Processing) - Hugging Face Transformers - PyTorch & TensorFlow - Jupyter Notebook and Python Scripting - GitHub project management - Evaluation Metrics (Precision, Recall, Confusion Matrix) - Basic GUI (if implemented for model demo)

6. Challenges and Solutions Challenge

Managing RAM during large model training. Solution: Used batch processing, reduced model size, and cleared GPU cache. Challenge: Matching embedding outputs with GAN input format. Solution: Carefully reshaped tensors and validated shapes using PyTorch. Challenge:

Understanding GAN internals. Solution: Studied official GAN tutorials and modified existing architectures for our specific use-case.

7. Outcomes and Impact

This internship helped me bridge theoretical knowledge with practical machine learning. I now feel confident in using NLP tools for real-world projects, especially with text embeddings and image generation. The projects completed during this internship will significantly strengthen my resume and technical portfolio. 9. Conclusion The NullClass internship has been an excellent opportunity to develop in-demand AI skills, explore cutting-edge tools, and execute projects independently. I'm thankful for this experience, and the projects I built will serve as foundational blocks for my future in AI/ML.