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GEN AI PROJECT PHASE 3 SUBMISSION DOCUMENT

**Phase 3: Final Report and Submission**

**1. Project Title:**

Next Sentence Prediction using Generative AI

**2. Summary of Work Done**

Phase 1 – Proposal and Idea Submission (10 Marks):  
We proposed building a system that predicts the next sentence based on a given input using generative transformer models. Our focus was on:  
- Understanding sequence modeling in generative models.  
- Using pre-trained GPT-2 to generate coherent next sentences.  
- Designing a user-friendly web interface for real-time interaction.  
  
Phase 2 – Execution and Demonstration (15 Marks):  
- A web app was created using Streamlit.  
- We employed GPT-2 from the Hugging Face Transformers library for generations.  
- The app accepts sentence input, tokenizes it, and returns the next sentence prediction.  
- Top-k sampling and temperature settings were used for better diversity in predictions.  
- Extensive testing was done to validate output relevance, coherence, and latency.

**3. GitHub Repository Link**

[🔗 GitHub Repository – Next Sentence Prediction using Gen AI](https://github.com/Shwetank0620/Next-Sentence-Prediction-using-Gen-AI)

**4. Testing Phase**

4.1 Testing Strategy  
- Input variety: simple, compound, domain-specific, and ambiguous phrases.  
- Validation through human review for contextual relevance.  
- Stress tests using unusually long inputs or malformed phrases.  
  
4.2 Types of Testing Conducted  
- Unit Testing: Tokenization, decoding, and generation logic verified independently.  
- Integration Testing: Model integrated with the Streamlit UI; tested full pipeline.  
- User Testing: Peer feedback on interface usability and prediction clarity.  
- Performance Testing: Evaluated generation speed and model stability across repeated queries.  
  
4.3 Results  
- Accuracy: Generated predictions were largely fluent and contextually appropriate.  
- Response Time: Predictions generated in under 2 seconds for typical inputs.  
- Edge Cases: Model showed graceful degradation on non-standard or nonsensical inputs.

**5. Future Work**

- Model Fine-Tuning: Custom training on academic writing or domain-specific datasets.  
- Multilingual Support: Expand prediction to include other languages using multilingual models.  
- Context Expansion: Incorporate paragraph-level history for richer context.  
- Enhanced UI: Add editing capabilities or visual feedback on model confidence.  
- Collaborative Mode: Let multiple users suggest or rate predictions in real-time.

**6. Conclusion**

The project demonstrates the feasibility and impact of transformer-based generative AI for next sentence prediction. It highlights how pretrained models like GPT-2 can be leveraged with minimal setup to create useful NLP tools. The working prototype, combined with a user interface, forms a strong foundation for advanced text generation applications.