Group Members
- BSDSF22A028
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Machine Learning Project Proposal

Project Title

NeuroNLP: Brain Cognition Scoring from Natural Language Text

🧩 Problem Statement

Human cognitive ability—such as clarity of thought, semantic richness, and emotional state can often be inferred through natural language. This project aims to build a system that evaluates typed or spoken user input using a pre-trained NLP model and generates scores reflecting mental clarity, emotional tone, vocabulary strength, and grammar structure. These will be visualized through engaging charts and feedback to help users understand their cognitive patterns.

🎯 Objectives

- Use a pre-trained transformer-based NLP model to analyze text.
- Extract metrics like coherence, vocabulary richness, emotional tone, and grammar.
- Calculate and display an overall **"brain score"**.
- Visualize results through **charts and semantic graphs**.
- Accept voice input via microphone and convert it to text.
- Make the application fast, lightweight, and ready for demo in 2 weeks.

🛠️ Proposed Methodology

Frontend:

- Built with **React/tsx** scaffolded.
- Pages:
  - **Home**: App intro, "Start Analysis" CTA.
  - **Analyze**: Text input area + mic input button.
  - **Brain Graph**: Displays bar/radar charts.
- Graphs for:
  - Cognitive metrics
  - Emotional tone distribution
  - Brain score dials

Backend:

- API built with **Next.js** API routes

- Connects to a **Python FastAPI microservice** running a pre-trained model (e.g., bert-base-uncased)
- Accepts text, processes it, returns structured metrics for frontend display.

Model:

- Pre-trained NLP model (like BERT or DistilBERT)
- Focus on real-time **inference only**, no fine-tuning
- Optionally augment with sentiment/emotion analysis (e.g., text2emotion, transformers-pipeline)

📏 Dataset Description

- No static dataset used.
- Real-time user input is analyzed directly.
- For model validation and benchmarking, small Kaggle datasets (e.g., readability or sentiment analysis) may be used temporarily.

📊 Expected Outcomes

- A functioning full-stack web application that:
    - Accepts typed or spoken text
    - Analyzes input with a pre-trained NLP model
    - Outputs brain and semantic analysis graphs
    - Works fast and reliably for demos or evaluation
- Visuals that help users reflect on how they're expressing themselves

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⏱ Timeline

Phase	Duration	Activities
Phase 1: UI Setup	3 Days	Design front end
Phase 2: Backend API	3 Days	Build API backend, connect inference pipeline
Phase 3: Model Integration	2 Days	Load and test pre-trained model
Phase 4: Visualization	2 Days	Add charts for brain metrics
Phase 5: Voice Input & Testing	2 Days	Integrate mic input and finalize demo

Total Duration: ~12 Days