Model Optimization and Tuning Phase Report

Date	12 February 2026
Team ID	LTVIP2026TMIDS66217
Project Title	**TransLingua – AI-Powered Multi-Language Translator**
Maximum Marks	10 Marks

Model Optimization and Tuning Phase

The Model Optimization and Tuning Phase focuses on improving the performance, efficiency, and reliability of the TransLingua system. Since the project uses a **pre-trained Gemini Pro large language model**, optimization is performed through **prompt engineering, inference parameter configuration, and UI-level performance tuning** rather than traditional hyperparameter tuning.

Hyperparameter Tuning Documentation.
***Note**: Gemini Pro is a pre-trained model; therefore, tuning is performed at the inference and prompt level.*

Model	Tuned Parameters	Optimal Values
Gemini Pro	Prompt structure	Clear instruction-based prompt with source and target language explicitly specified
Gemini Pro	Input length handling	Supports short, medium, and long text inputs
Gemini Pro	Temperature (Creativity control)	Default (balanced for accuracy and fluency)
Gemini Pro	Response format	Text-only translation output
Gemini Pro	API latency optimization	Single-call inference per request

Performance Metrics Comparison Report

Optimization Aspect	Before Optimization	After Optimization
Translation Accuracy	Moderate	High
Context Preservation	Medium	Improved
Response Time	Slight delay	Reduced latency
User Experience	Basic	Enhanced and intuitive

Optimized Performance Summary

Metric	Observation
Translation Quality	High and context-aware
Response Speed	Fast and consistent
Multilingual Support	Successfully handled
System Stability	Reliable under varied inputs

Final Model Selection Justification

Final Model	Reasoning
Gemini Pro (gemini-1.5-flash)	The model was selected due to its superior context-aware translation capabilities, multilingual support, low latency, and seamless API integration. Prompt optimization and inference tuning significantly enhanced performance, making it well-suited for real-time language translation applications.