Model Card

Title: Clinical LOS Classifier + GenAI Summarizer for ICU Decision Support

Project: Inference Trace: GenAI's 2nd Opinion

Model Details

Attribute	Description
Type	Binary Classifier (Random Forest), plus Text Generator (LLM)
Purpose	Predict ICU patient Length of Stay (LOS) & summarize patient risk using GenAI
Target	ICU patients in MIMIC-IV (v3.1)
Inputs	Structured FHIR Bundles + SHAP-injected features
Outputs	LOS prediction (short vs. long stay), SHAP explanation, and GenAI natural language summary
Tools	scikit-learn, shap, HuggingFace Transformers, ClinicalBERT, Nous-Hermes-2-Mixtral

Intended Use

This model is designed as an educational demonstration of:

- Explainable clinical ML (SHAP + Permutation Importance)
- GenAI prompting for patient case summarization
- Ethical CDS design using ICU datasets (MIMIC-IV)

Not for clinical deployment. Outputs are illustrative only.

Metrics

Metric	Value (on test set)
Accuracy	0.82
ROC-AUC	0.87
SHAP Feature Top 3	Age, GCS Score, Creatinine

LLM AUC (Human-Rated) Pending

Explainability

- Local: SHAP values per patient (plotted, injected into FHIR)
- Global: Permutation importance
- Post-Hoc Integration: SHAP stored in output/shap/ and embedded in output/genai/ prompts

Ethical Considerations

Concern	Approach
Data Privacy	De-identified ICU data (MIMIC-IV)
Model Bias	No race or ethnicity features used
Explainability	SHAP + logs of inference traces
Traceability	All GenAI responses logged (output/genai_answers/)
Deployment Risk	Not intended for real-world medical use

Validation Example

"prompt": "You are a clinical reasoning assistant. Summarize key risk factors and concerns from the patient bundle."

"response": "Patient presents with high creatinine and low GCS, indicating potential renal dysfunction and altered mental status..."

Files Referenced

- train_los_model.py: Classifier training
- shap_model_iv.py: SHAP explainability
- genai_infer.py: Prompting & GenAI output
- output/genai/: Prompt logs & summaries
- output/shap/: Feature importance plots

References

- Johnson et al. (2021) - MIMIC-IV Clinical Dataset

- Lundberg & Lee (2017) - SHAP

- Alsentzer et al. (2019) - Bio_ClinicalBERT

- Hugging Face Inference API - Nous-Hermes-2-Mixtral-8x7B-DPO