Stroke Detection

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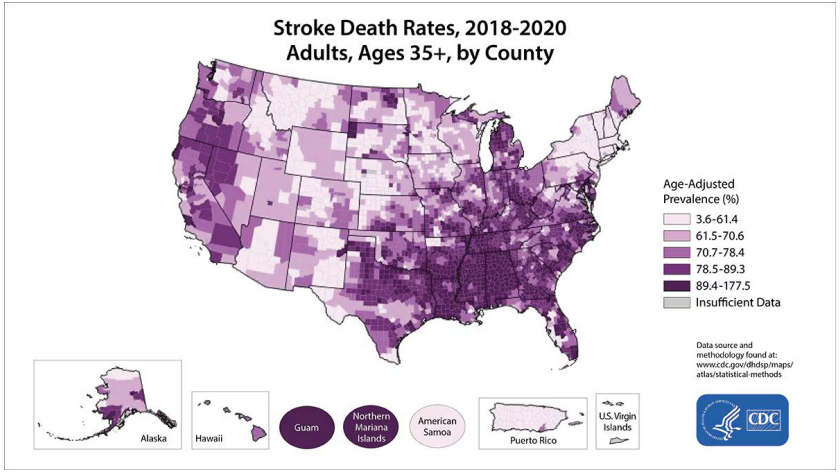
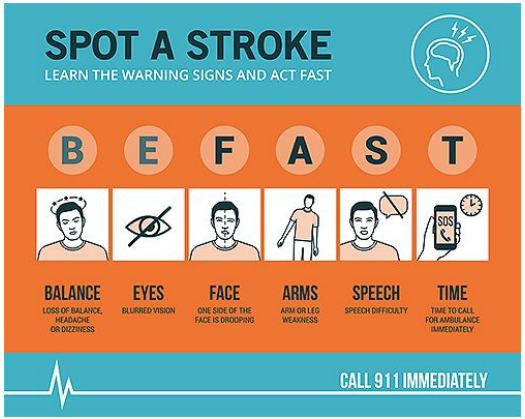
Summarize

- **Motivation**: Early action is **crucial** in stroke cases, as the chances of survival significantly increase with immediate emergency treatment.
- **Problem Statement**: Stroke is a medical emergency where delayed treatment can lead to severe disability or death. Many victims do not receive timely treatment due to delays in recognizing symptoms and accessing emergency care.
- **Proposal**: The recent advancements in AI and machine learning present an opportunity to develop a platform that can detect potential strokes early.

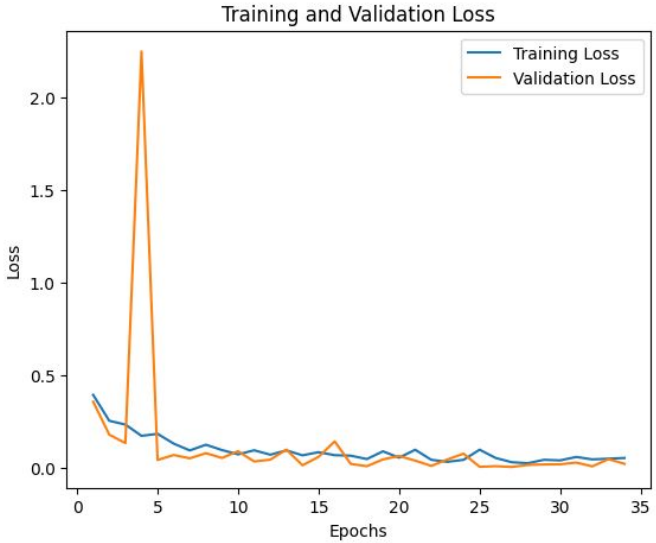


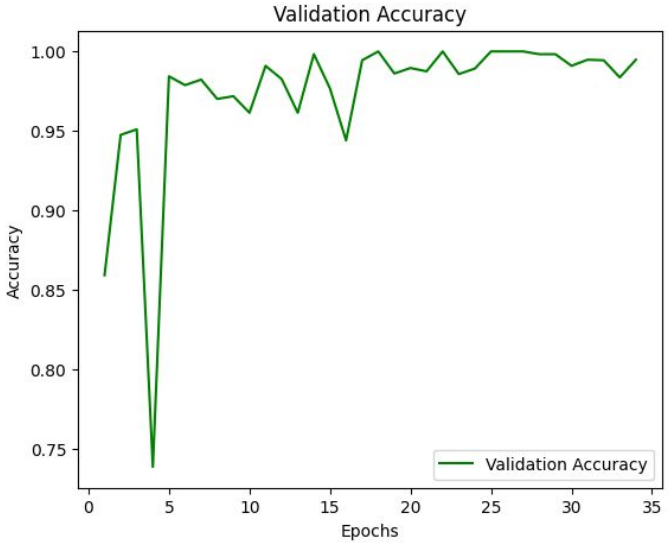


Residual Network

- ResNet50 for facial stroke prediction with **98.37%** of accuracy over 3770 images consists of two classes: **stroke** and **no stroke** where data augmented techniques were used.

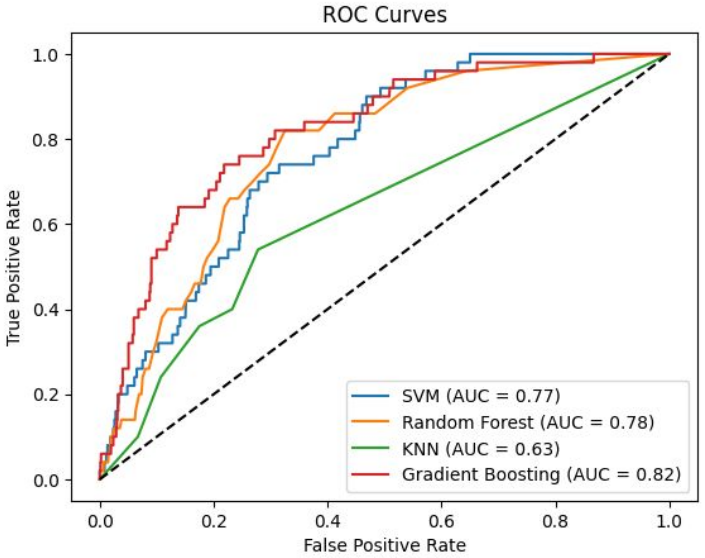
- Model performance:





Random Forest

- For stroke prediction based on medical history data, the Gradient Boosting model achieved an accuracy of **81.95%**, outperforming other models such as K-Nearest Neighbors (KNN), Support Vector Machine (SVM), and Random Forest.
- The dataset used for training was imbalanced, with more non-stroke cases than stroke cases; hence, SMOTE was applied.
- Model performance:



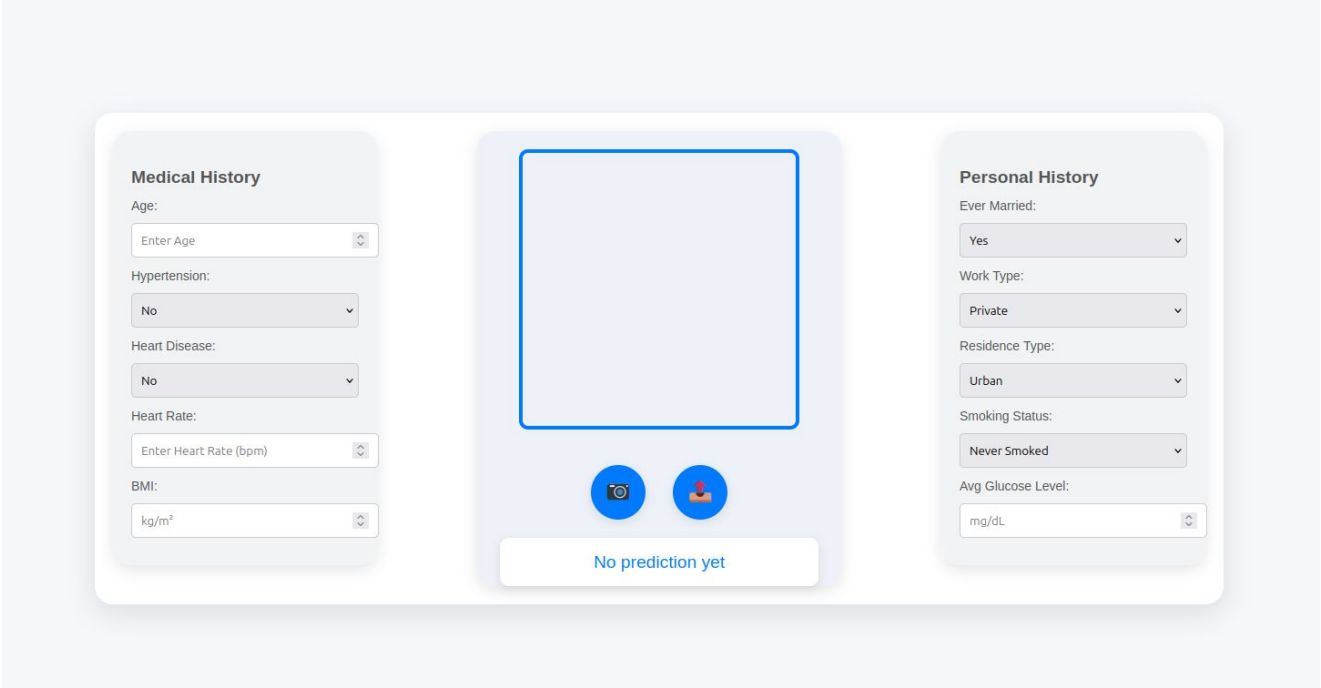
Multimodal

- To enhance the performance of your stroke prediction system, you're combining the predictions from two models: **ResNet50** (trained on facial images) and **Gradient Boosting** (trained on medical history).

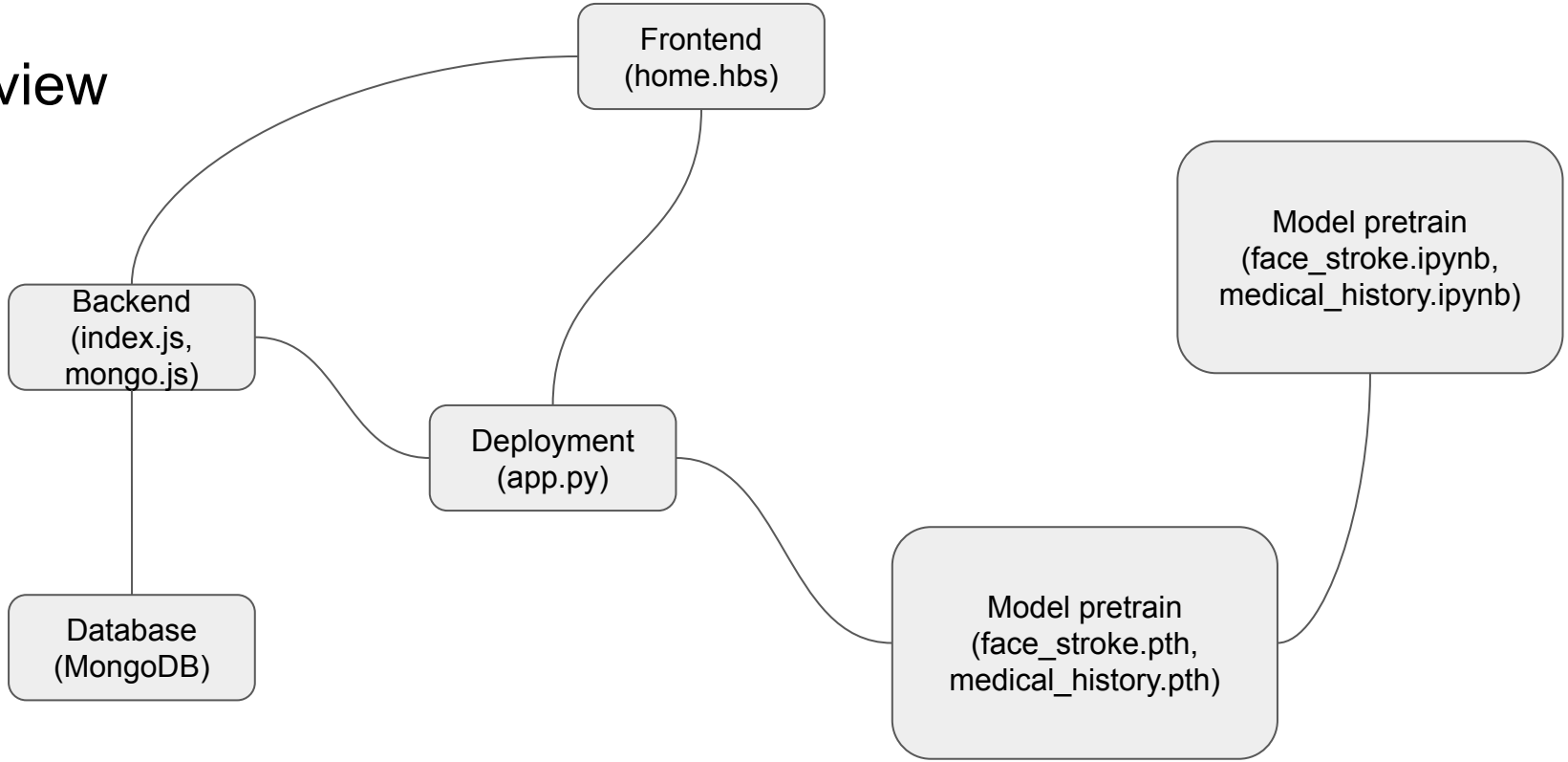
- The combined multimodal approach assigns a **60% weight to the ResNet50 predictions** and **40% to the Gradient Boosting predictions**, reflecting the importance of both image-based and medical data in stroke detection.

$$P_{final} = 0.6 \cdot P_{ResNet50} + 0.4 \cdot P_{GradientBoosting}$$

User Interface



Overview

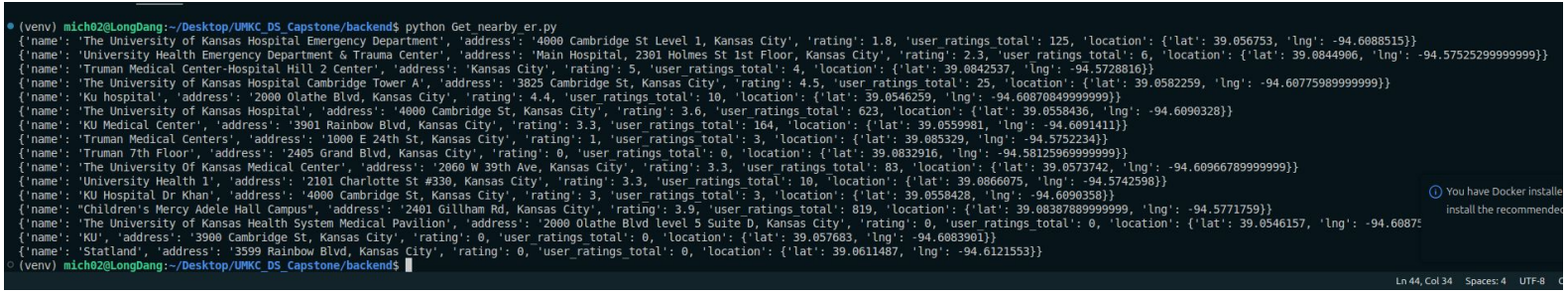

Frontend
(home.hbs)
Backend
(index.js,
mongo.js)
Model pretrain
(face_stroke.ipynb,
medical_history.ipynb)
Deployment
(app.py)
Database
(MongoDB)
Model pretrain
(face_stroke.pth,
medical_history.pth)

Challenges

- Trouble connecting multimodal with frontend (data format mismatch, API communication)
- The UI camera doesn’t work
- Limited to LLM integration

Future work

- Fix the data format and ensure API is working well
- Improve UI with camera available
- Incorporate LLM into the platform
- Set an emergency switch when the predict above 95% chances of having stroke.



Thank you