

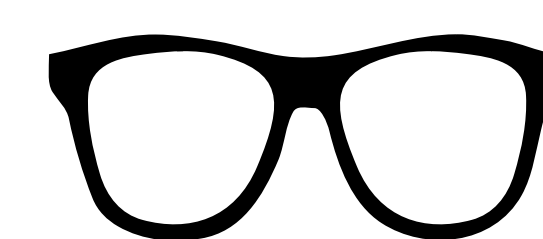


הסרת משקפיים בלייזר בעזרת AI

ג'אן זעאתרה, רהף סביח, שאדי דהאמשה ועומר ותד

מנחה: ד"ר גלעד כץ

Goal



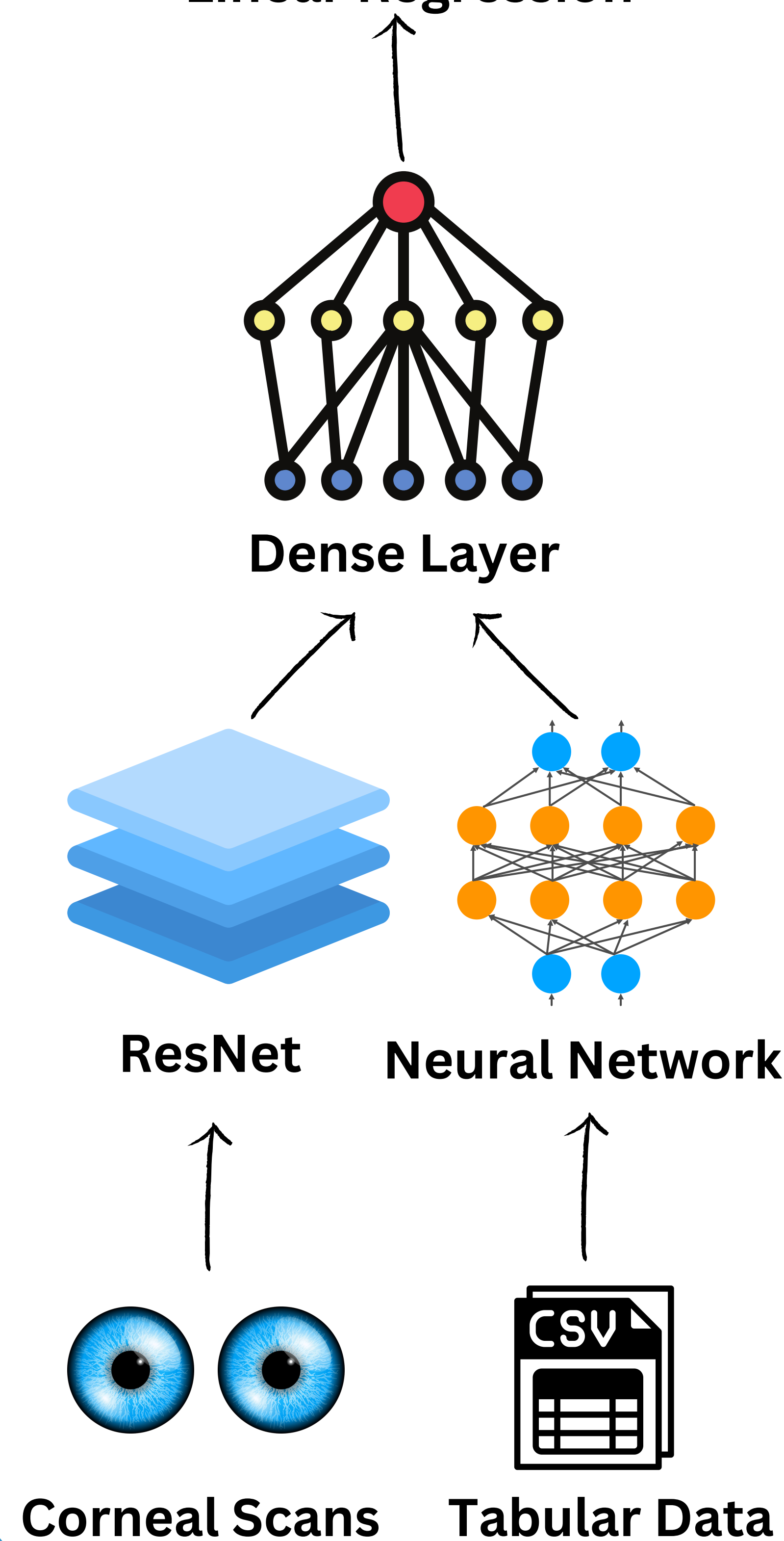
- Predicting the Success Rate of Laser Eye Surgery
- Innovative Combination of Corneal Imaging and Tabular Medical Data for Each Patient

Motivation

- Creating an advanced tool that will help ophthalmologists making informed decision before LASIK surgery
- To improve the chances of success of the surgery, as well as increasing the accuracy and reliability of the proposed treatment
- Increasing the level of confidence of patients and doctors

Model

Predicting surgical success
Linear Regression

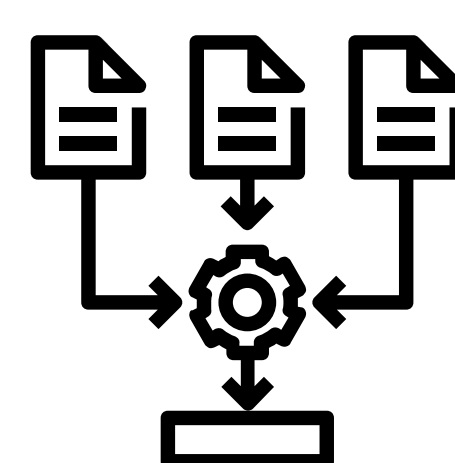


Our Solution



Tabular Data Processing

Data cleaning, Addressing missing values, Handling categorical variables, Scaling and normalizing data



Tabular Data Model

6 hidden layers, Activation functions, Dropout layers to prevent overfitting, Adam optimizer for training efficiency

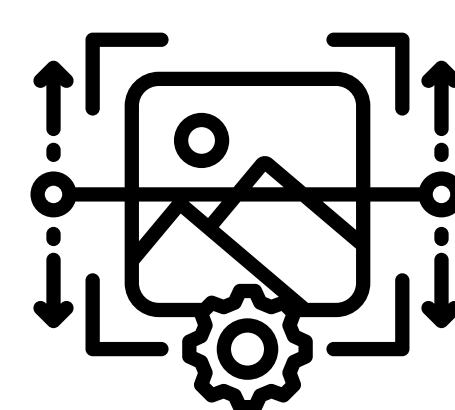
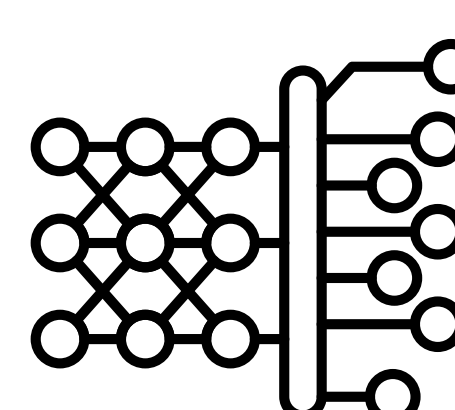


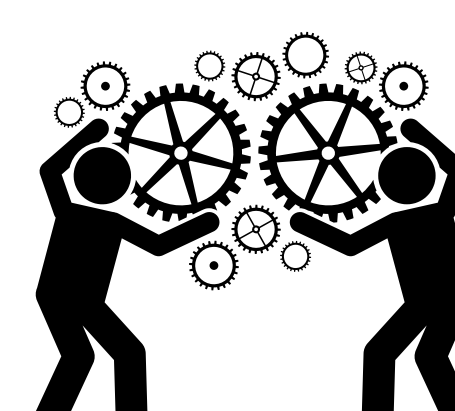
Image Processing

Feature extraction from images, Image augmentation (e.g., rotation, scaling), Batch normalization



CNN Model

Implementation of DenseNet-121 and ResNet50, Fine-tuning for image classification tasks

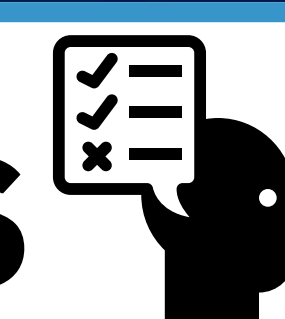


Model Integration

Combining models for enhanced performance, Feature extraction followed by fully connected layers



Experiments Results and Conclusions



- CNN: ResNet-18, 50, 152 and DenseNet-121. MLP: Random Forest with XGBoost
- Diverse training strategies and data augmentation
- **Results: Precision: 0.9442, Recall: 0.8534, Accuracy: 0.8693, AUC: 0.8770 False Alarm Rate: 0.0994**
- Concluded combining tabular data with corneal scans improved forecast performance over using each type of data separately.
- Concluded indices Subjective BCVA, Subjective SEQ and Treatment SEQ are important for prediction.
- We recommend refining the dataset and fine-tune model parameters to improve performance.