



使用智慧手錶的心電圖訊號建立心臟病風險預測智慧手機應用程式

Building Smartphone Applications for Heart Attack Risk Prediction using ECG Signals from Smartwatches

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Research motivation

- Heart disease is leading cause of death
- ECG can be used for heart attack detection
- Smartwatch advancements, including ECG recording

Research methods

- Machine learning**
Get data from Kaggle > Preprocessing > Train with ML models > Save into tflite and pickle format
- Back-end**
Develop server with Flask and MySQL, connect with the app through REST API
- Mobile app**
Develop mobile app using Flutter and Flutter's Health package

Results and Discussion

Training Accuracy: 86.97%
Testing Accuracy: 86.66%
Anomaly Accuracy: 30.25%

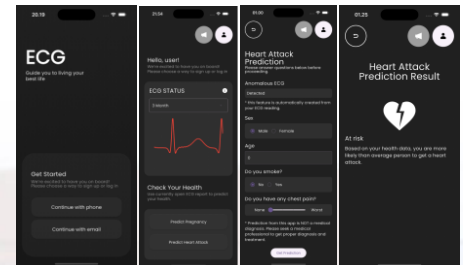
Training Accuracy: 93.89%
Testing Accuracy: 90.61%
Anomaly Accuracy: 72.38%

LSTM autoencoder CNN autoencoder
(Anomaly prediction)

Accuracy: 94.14634146341463 %

Classification Report:				
	precision	recall	f1-score	support
0	0.95	0.93	0.94	102
1	0.93	0.95	0.94	103
accuracy			0.94	205
macro avg	0.94	0.94	0.94	205
weighted avg	0.94	0.94	0.94	205

Decision Forest
(Heart attack risk prediction)



User interfaces

Anomaly prediction

- Decided CNN autoencoder is best and is used for the actual application

Heart attack risk prediction

- Decided decision forest is good enough for the actual application

Backend

- Server built using Flask and MySQL
- Server is seen to be able to take the requests and return data as hoped, meaning the development was successful

Mobile application

- Implemented pages home, register, login, prediction pages
- User can go to each page as intended, data retrieved for the server is displayed successfully on the mobile application.

Conclusions and Future Works

- Great model accuracy (Decision Forest): 94.1%
- Flask server serve database and prediction request well.
- The flutter app provides the user with an functional interface. Marks a step on learning the integration of ML in mobile apps despite improvement needed on the app.

References

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- Shayan Fazeli. (2018). ECG Heartbeat Categorization Dataset.