

# 亞洲大學|資電學院

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# 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 指導老師: Dinh-Trung Vu老師 組員: Fahrial Hisyam/110021133、 Arya Widia Putra/112021200、 M Naufal Ihza S/112021223、 Satria Surya Prana/112021225

### 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	n Report: precision		f1-score	support			
9 1	0.95 0.93	0.93 0.95	0.94 0.94	102 103			
accuracy macro avg weighted avg	0.94 0.94	0.94 0.94	0.94 0.94 0.94	205 205 205			

Decision Forest
(Heart attack risk prediction)

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500	•	Heart Attack	(a)	
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	ECG STATUS •	Anomalous ECG		
	Shipeth -	* this feature is outcomedically awarded from pour ECO meeting		
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		® MSR C Female	At risk	
		Age	based on your health data, you are more	
AND THE RESIDENCE OF THE PARTY			likely than average person to get a heart attack.	
Get Started		Do you smoke?		
White excited to have you on board! Places choose a way to sign up or log in	Check Your Health	@ No () Nos		
200	tion currently apen RCS report to predict your tenation.	Do you have any chest pain?		
Continue with phone		Nove @ Nove		
Continue with email	Predict Pregnancy	* Predictive from this app is NET a medical chagnesis. Mease seek a reedical		
	Predict Heart Attock	professional to get proper diagnosis and bestimed.	<u> </u>	
		Old PrindleTron		

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**

- 1. Great model accuracy (Decision Forest): 94.1%
- 2. 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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