AI in Biomedicine
Final Assigment

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Outline

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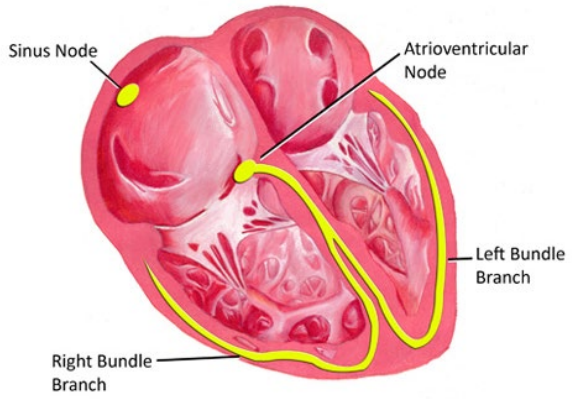
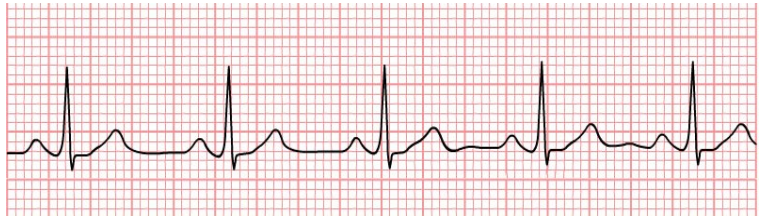
Part 1: PAC/PVC

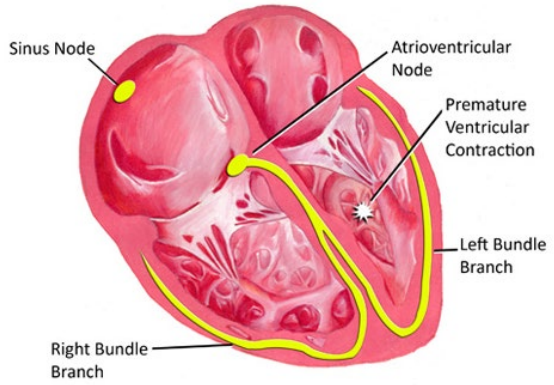
PAC/PVC: Electrophysiology

Normal Sinus Rhythm

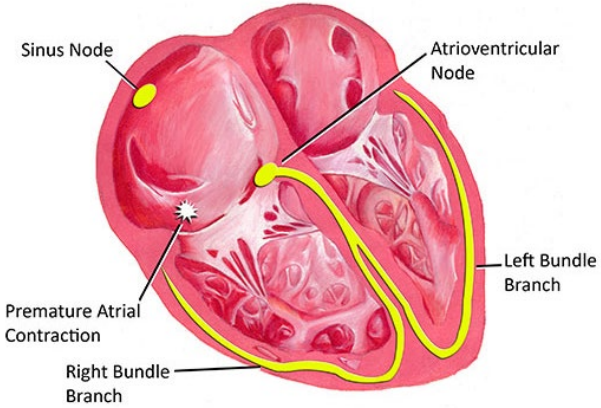


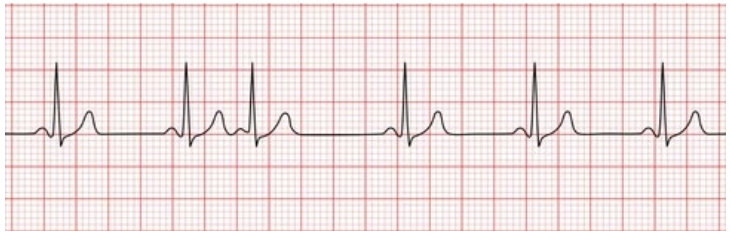


Premature Ventricular Complex



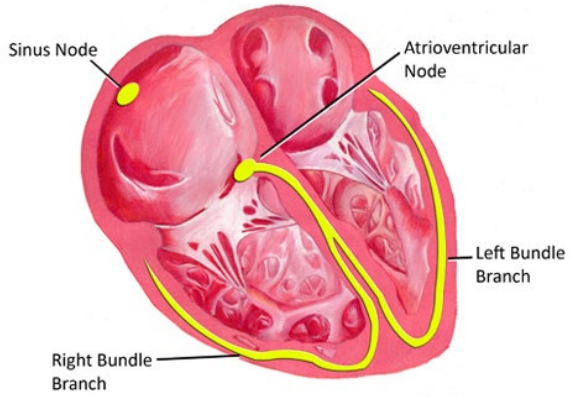
Premature Atrial Complex

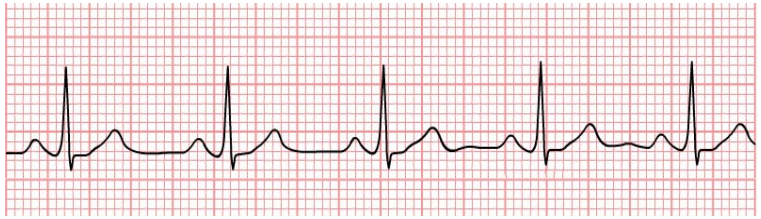




PAC/PVC: Problematics

Normal Sinus Rhythm



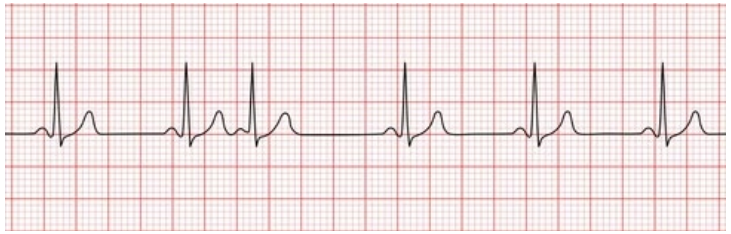


Premature Ventricular Complex

- Benign: symptomatic/ asymptomatic
- Frequent PVC, sometimes paired with left ventricular dysfunction [1].
- LV dysfunction progression (long-term) [1].

Premature Atrial Complex

- Benign: symptomatic/ asymptomatic
- Frequent PAC associated with increased stroke and death [2].
- PAC for prediction of fist time appearance of AF [3].



Part 2: Assignment objective

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Create a beat classifier for ECG signals:

Classify every beat into Normal (N), Supraventricular (S) and Ventricular (V)

Input:

- 2-lead ECG signal of length n
- R peaks position

Output:

- N/V/S annotation for each R peak position

N: normal sinus rhythm beats

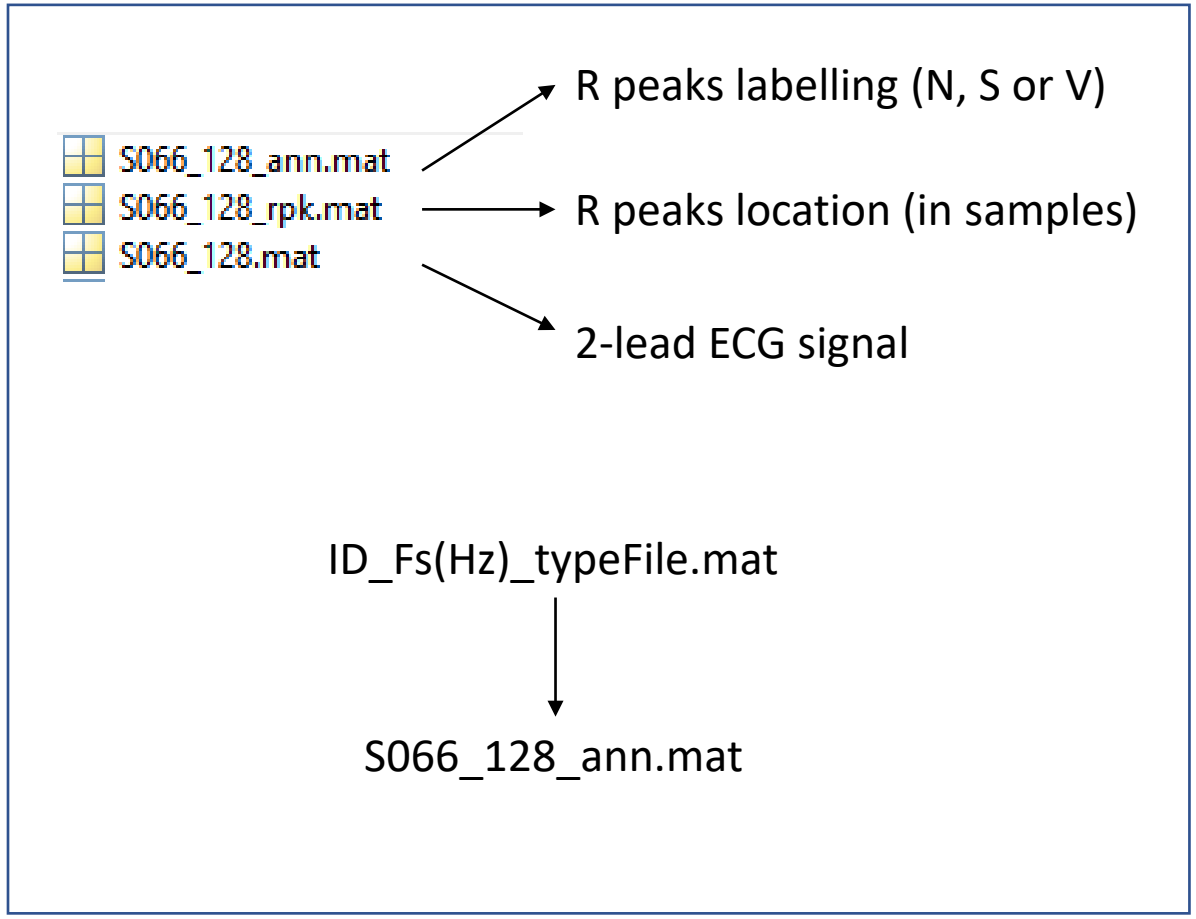
S: supraventricular beats (PACs)

V: ventricular beats (beats originating in the ventricles, mostly PVCs)

Part 3: Database

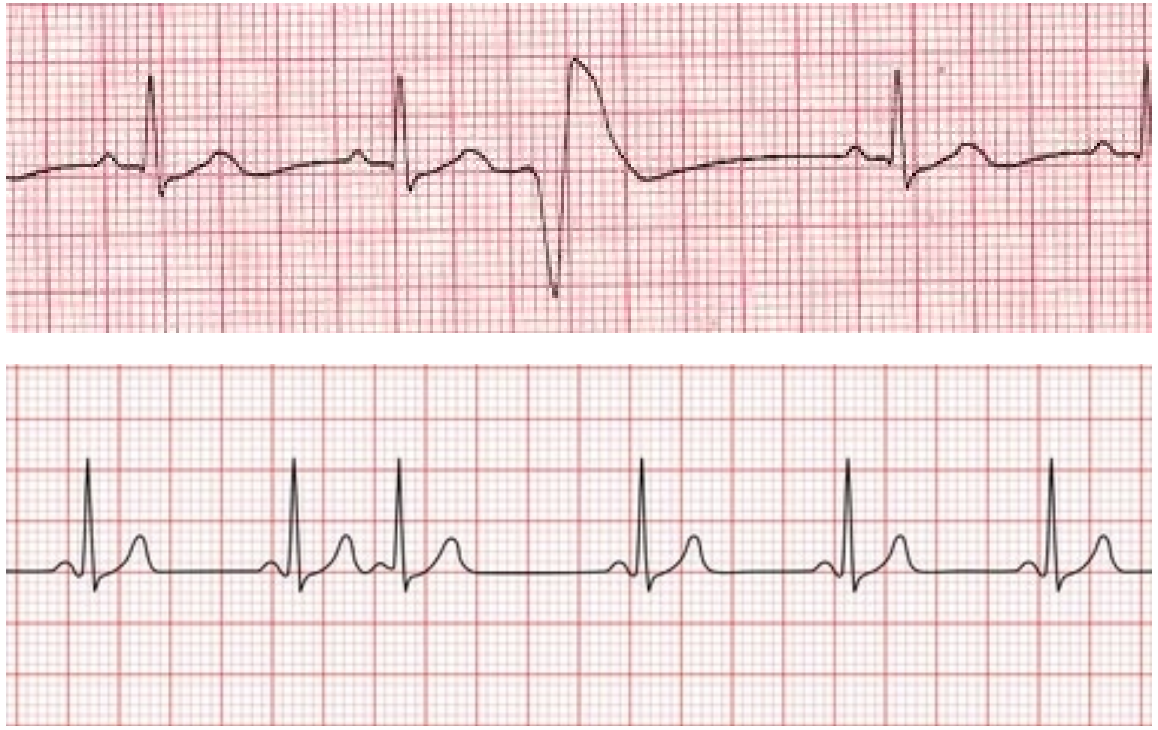
3.1. Description

- Total number of patients: 105
- Fs: different sampling frequencies, some 128 Hz, others 250 Hz
- 2-lead ECGs
- R peak position annotations
- Labelling: N, S and V classes



3.2. Key elements

- Decision of network input: take into consideration how PAC and PVC affect the signal.



Part 4: Evaluation

4.1. Report

- Write a report in paper format: introduction (brief), materials and methods, results, discussion and conclusion
- Describe in detail the signal preprocessing, the model chosen and its training.
- Justify your choices in a sensitive way and provide a clear interpretation of the results obtained

4.2. Scoring

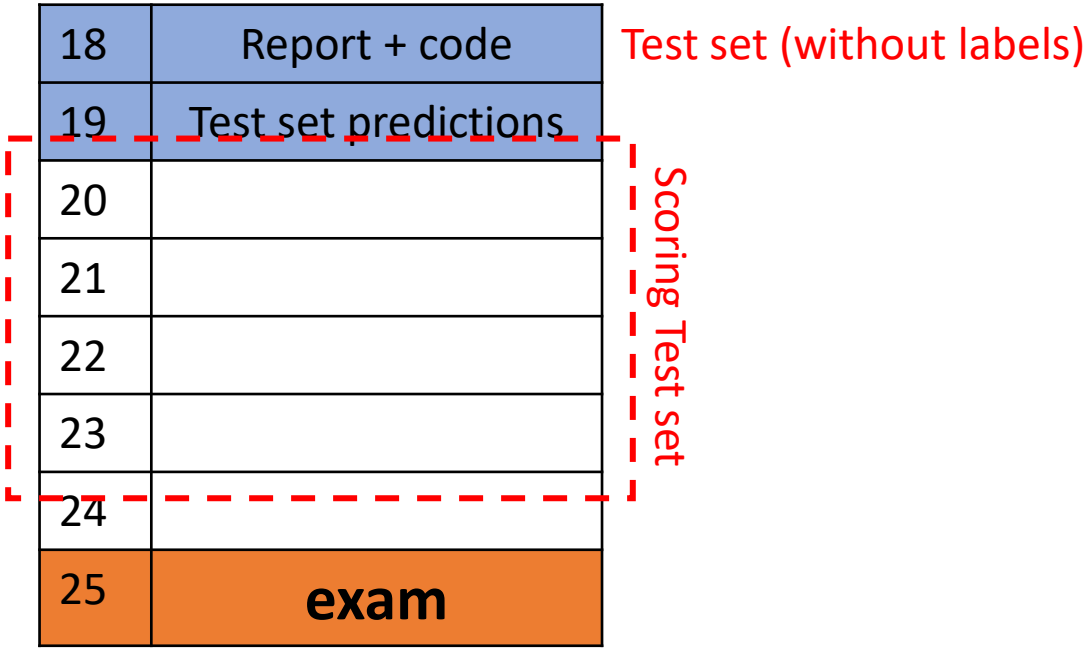
1. Submit report + code (training code and the final working model) one week before the exam. Provide results on validation and test performed locally (on your computer) using the training set.
2. Once the report and code have been submitted you will be provided with a test set without labels: submit the labels created by your model within the **next day of the submission** in the same format as the labels provided to you in the training set
3. In the next days, you will be provided with a test set scoring (previous to the exam) .
4. In the exam you will have to justify the choices made and to interpret the results obtained. You will also have to answer questions regarding the material seen during the lectures and practical sessions.

4.3. Deadlines

Possible exam days:

- 18 January
- 19 January
- 25 January
- 26 January

- 1 February
- 2 February
- 8 February
- 9 February
- 15 February
- 16 February



Link to dataset

https://drive.google.com/drive/folders/1e1g0htpfBXe-CP1woGaLWOnp2wiX8ze5?usp=sharing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