UNIVERSITY OF MALAYA

ALTERNATIVE ASSESSMENT FOR THE DEGREE OF MASTER OF COMPUTER SCIENCE

ACADEMIC SESSION 2022/2023 : SEMESTER I

WOA7015 : Advanced Machine Learning

Jan 2023

INSTRUCTIONS TO CANDIDATES :

Answer **ALL** questions (50 marks).

(This question paper consists of 2 sections on 1 printed page)

Project:
Neonates are classified as children in the first 4 weeks of their lives. At this early stage of their lives, vitals such as their heart and respiratory rates are important clinical indicators to monitor their status as newborns. The heart rate of infants requires resuscitation within the first few minutes of birth is known to be an estimator of early neonatal mortality and potentially severe brain injury in those who survive. Hence, an accurate assessment of heart rate at birth is crucial in guiding further interventions such as effective resuscitation efforts.

Several known methods of measuring heart rate in neonates, are electrocardiography (ECG) and pulse oximetry. These methods typically involve attaching many devices to the neonates, resulting in rather intrusive methods. Despite being the more accurate method of heart rate evaluation, ECG is also observed to have its limitations when applied to neonates such as the possibility of damaging the skin of extremely premature infants and requiring clinician experience to operate optimally.

In this project, you will investigate the possibility of estimating heart rate directly from the respiratory signal based on the knowledge that there exists a correlation between respiration and heart in neonates.

Dataset:
Download the datasets from Spectrum.

Deliverables: There are three components in this project.

Project Proposal (5% - Due on Week 10):
Write a two-page document that describe the plan for your project. The proposal should clearly explain how you obtain the heart rate (target variable) from the dataset, how you handle the data (preprocessing/ splitting to avoid data leakage), what algorithm is used or built (model architecture), and why you think this algorithm can solve the problem. Identify the relevant algorithm you intend to implement as a baseline. State the evaluation metrics to evaluate the model performance.

Poster Presentation (5% - Week 14)
We will have a poster session, where each group will present a conference-style poster on screen. You will be given a poster template to work on and then submit it in PDF format.

Final Report and Code (40% - Week 14)
Write the report of with 10 pages min. Please use the report template in Spectrum. In the report, you should clearly

- explain your approach and review the relevant literature,
- explain the experiment setup clearly,
- show the results,
- discuss the findings and limitations and make a conclusion.

Please upload your code with explanation to GitHub and share the link in your report. Please use APA style in formatting your references.

END