

Module details

Code: ELEC6259

Title: Project Methods and Project Preparation

Academic year: 2023-24

Credits: 15

<https://secure.ecs.soton.ac.uk/module/2324/ELEC6259/41122/syllabus>

Assessment

Summative

Assessment method	Contribution to final mark
Poster Presentation	20%
Project plan	40%
Research review	40%

Referral

Assessment method	Contribution to final mark
Coursework assignment(s)	100%

Repeat

Assessment method	Contribution to final mark
Coursework assignment(s)	100%

Repeat information

Internal & External

Assignments

1. **Mon 18 Dec, 12:00, 2023** **DRAFT ONE PAGE for Review plus Meeting Notes and Meeting Summary** : Handin [Feedback has been overdue since Wed 31 Jan]
2. **Fri 12 Jan, 12:00 Project Review**: Handin [Feedback has been overdue since Tue 28 Feb]
3. **Wed 24 Apr, 12:00 Project Preparation Poster**: Handin [Feedback due Fri 24 May]
4. **Wed 15 May, 12:00 Outline Project Plan**: Handin

<https://secure.ecs.soton.ac.uk/module/2324/ELEC6259/41122/>

1 – 3, is completed already.

Work on 4

Coursework 3:

Details available in the link

<https://secure.ecs.soton.ac.uk/notes/elec6259/coursework3.html>

COMP6200 MSc Project

Project Schedule 2024

Start date of project	Monday 10th June 2024
Project brief	Monday 24th June 2024
Start date of demonstrations	Monday 19th August 2024
Dissertation handin	Thursday 5th September 2024
MSc Project viva scheduled during the week of	Monday 23rd September 2024
Projects results and feedback	Last week of November 2024

<https://secure.ecs.soton.ac.uk/notes/comp6200/>

Project Outline: WiFi CSI-based Gesture Recognition

NOTE: Below is a sample of the plan, you are required to refer this and make your own

1. Define Project Objectives and Hypotheses

- **Objective:**
 - To develop an accurate and robust gesture recognition system using WiFi Channel State Information (CSI).
- **Hypotheses:**
 - WiFi CSI contains sufficient information to distinguish between different human gestures.
 - Machine learning algorithms/Deep learning algorithms trained on WiFi CSI data can accurately classify gestures with high accuracy.

2. Literature Review

- Review existing literature on WiFi CSI-based gesture recognition systems.
- Analyze methodologies, datasets used, performance metrics, and limitations.
- Identify state-of-the-art techniques, algorithms, and tools applicable to WiFi CSI data analysis and gesture recognition.

At least 20 – 25 relevant articles (before the start date of the project) are to be referred to and analyzed, not later than 4 years from now. Recommended to make a literature matrix of your findings.

3. Data Acquisition and Preprocessing

- Identify and select a suitable public dataset containing Wi-Fi CSI samples for gesture recognition.
- Understand the data format and features available in the dataset.
- Preprocess the data to handle noise, missing values, and outliers.
- Extract relevant features from the Wi-Fi CSI data that are informative for gesture recognition.

Do a planning for performing the above, based on the literature review.

4. Model Selection and Design

- Choose appropriate machine learning algorithms/Deep learning algorithms for gesture recognition using Wi-Fi CSI data (e.g., deep learning models, support vector machines, decision trees).
- Design the architecture of the chosen models, for example: considering input features, network layers, activation functions, and output layer structure.
- Explore techniques for model optimization, such as hyperparameter tuning and regularization.

5. Dataset Splitting and Training

- Split the dataset into training, validation, and testing sets.
- Ensure proper distribution of gesture samples across the splits to avoid bias.
- Train the selected models on the training set using appropriate optimization algorithms and loss functions (whichever is applicable).
- Validate the models' performance on the validation set to tune hyperparameters and prevent overfitting.

6. Model Evaluation

- Evaluate the trained models' performance on the test set using relevant evaluation metrics (e.g., accuracy, precision, recall, F1-score).
- Compare the performance of different models and variations to identify the most effective approach.
- Conduct statistical analysis to assess the significance of the results (if required/applicable).

7. Results Interpretation and Analysis

- Interpret the results to understand the strengths and limitations of the proposed gesture recognition system.
- Analyze misclassifications and errors to identify potential areas for improvement.
- Discuss the implications of the findings and how they contribute to the existing knowledge in the field.

8. Documentation and Reporting

- Document the Project methodology, experimental setup (if public dataset is adopted, explain the experimental setup adopted by the researchers), and results in a comprehensive report.
- Provide code implementations, algorithms, and any custom tools developed during the Project.
- Publish the findings in relevant academic journals or conferences to contribute to the research community (Recommended, however not mandatory).

9. Future Work

- Discuss potential avenues for future project and enhancements to the gesture recognition system.
- Propose experiments or methodologies to address limitations or extend the scope of the Project.

10. Peer Review and Feedback

- Seek feedback from your research supervisor, peers, mentors, or domain experts to validate the Project methodology and findings.
- Incorporate constructive criticism and suggestions to refine the Project work further.

By following the above Project plan, you can systematically conduct Wi-Fi CSI-based gesture recognition Project using a public dataset and contribute valuable insights to the field.

It is highly recommended to maintain a detailed logbook and Github profile throughout the project phase. This must include records of all readings, discussions, and findings encountered during the literature review, experimentation, and analysis phases. Additionally, it is crucial to diligently capture and document all results obtained during implementation to ensure thorough tracking and prevent oversight of any pertinent information.

Academic Integrity:

Adhering to academic integrity, it is imperative to ensure that all information referenced is appropriately cited using suitable referencing tools, such as EndNote or Mendeley. Manual referencing should be avoided to facilitate easy documentation and maintain accuracy in citing sources.

Important Instruction:

During every supervisor-student meeting, it is essential to meticulously document each meeting's proceedings. This involves recording key discussions, decisions, and assigned action items. Following each meeting, these detailed minutes should be promptly distributed to the supervisor (within 2 days after the meeting), serving as a clear reference point for agreed-upon tasks and deadlines. By adhering to this practice, both supervisor and student can maintain transparency, accountability, and efficient follow-up, ensuring seamless progress in the entire project journey.