

CSE/CPEG Final Year Project/Thesis


Monthly-Report Submission Guideline

Objective: To track the progress of the Final Year Project/Thesis (FYP/FYT).

- There are 3 monthly reports which account for **5%** of the final grade.
- There are 3 monthly reports due in the Fall, i.e. Oct, Nov and Dec/Jan. The monthly reports in Oct and Nov are due by 11:59pm on the last day of each month. The monthly report in Dec/Jan is due by 11:59pm on 15 Jan.
- We recommend the meetings with project advisor(s) to take place in the middle of the month in Oct, Nov and Dec.
- It is the responsibility of the student to submit the completed report to the FYPMS.

Monthly Report for CSE FYP/FYT

Project Code:	PAN3	Supervisor(s):	Prof. Pan HUI
Project Title:	Spatiotemporal Fuel Consumption Forecasting		
Group Member(s) and Student ID(s):	YAP, Zhi Yun (20479594)		
Reporting Period: <ul style="list-style-type: none"> Scan report and submit via the FYPMS 	Report #1 <input type="checkbox"/> Oct Report #2 <input type="checkbox"/> Nov Report #3 <input checked="" type="checkbox"/> Dec/Jan		
Progress: <ul style="list-style-type: none"> List the work completed in this reporting period. Identify the major difficulties encountered. Comment on the overall progress. 	<ol style="list-style-type: none"> Dataset preparation <ul style="list-style-type: none"> Reviewed preprocessing steps of standard datasets for traffic flow prediction task (PeMSD, METR-LA). Extracted top 500 most active road segments to resolve data sparsity. Preprocessed and aggregated trajectory data into 15 minutes interval as ground truth. Feedback: Mr. Ahmad recommended another approach to better infer the missing fuel consumption data. Graph construction <ul style="list-style-type: none"> Prepared weighted adjacency matrices for all three POI, speed similarity, and neighborhood graphs. <u>POI graph & speed similarity graph</u>: edge weights are computed using Jaccard similarity and Dynamic Time Warping algorithm respectively. <u>Neighborhood graph</u>: pairwise road network distances for 500 nodes are extracted from OSRM API to tackle data sparsity in Shenzhen dataset; edge weights are then computed using thresholded Gaussian kernel. Baseline model & Experiment setup <ul style="list-style-type: none"> Defined 3 statistical and 3 SoTA deep learning-based (ST-GCN, DCRNN ST-MGCN) methods as baselines. Implemented autoregressive integrated moving average (ARIMA) method and evaluated against dataset for RMSE and MAPE metrics. Proposed using PeMSD and METR-LA datasets to further evaluate the novel framework on the common traffic flow prediction task. Feedback: Mr. Tristan recommended to shorten prediction intervals to [15, 30, 45] minutes. Design of novel framework <ul style="list-style-type: none"> Proposed methodology to focus on 2 areas of improvement: (i) error propagation in long-term prediction task, (ii) fusion mechanism for multigraph representation. Reviewed relevant NLP and GNN papers of each area. Revised previously proposed framework; integrate attention fusion mechanism and graph attention layer to T-GNN model architecture. Feedback: Mr. Tristan recommended different techniques to tackle error propagation issue; Mr. Ahmad suggested meeting MingYang for further comments on architecture design. Overall progress <ul style="list-style-type: none"> Progress is almost as planned. More offline meetings are expected to be scheduled in winter semester. 		

Future Plan: • Write down the working plan	Following milestones are to be achieved before the end of January: <ol style="list-style-type: none"> 1. Review preprocessing steps in dataset preparation stage on how to handle missing values in fuel consumption data, as recommended by Mr. Ahmad. 2. Modify Shenzhen dataset for evaluation of remaining 5 baseline models. 3. Finalize the model architecture and start building the T-GNN model. Upon completion of the work abovementioned, the remaining time of the project will focus on hyperparameter tuning and enhancement of model architecture.		
Supervisor's Comments:	The progress is as planned. Since the data pre-processing the literature review are almost done, now Zhi Yun can proceed to the finalised model and also data processing. More research works are expected during January before getting too busy when the new semester starts.		
Supervisor's Overall Evaluation:	<div style="display: flex; align-items: center;"> (please circle) <div style="display: flex; gap: 5px;"> <div style="border: 1px solid black; padding: 2px 5px;">F</div> <div style="border: 1px solid black; padding: 2px 5px;">D</div> <div style="border: 1px solid black; padding: 2px 5px;">C-</div> <div style="border: 1px solid black; padding: 2px 5px;">C</div> <div style="border: 1px solid black; padding: 2px 5px;">C+</div> <div style="border: 1px solid black; padding: 2px 5px;">B-</div> <div style="border: 1px solid black; padding: 2px 5px;">B</div> <div style="border: 1px solid black; padding: 2px 5px;">B+</div> <div style="border: 1px solid black; padding: 2px 5px;">A-</div> <div style="border: 1px solid black; padding: 2px 5px; border-radius: 50%;">A</div> <div style="border: 1px solid black; padding: 2px 5px;">A+</div> </div> (fetter grade) </div>		
Meeting Date & Time:	6 Jan 2021 11.30am		
Group Representative's Signature:		Supervisor's Signature:	