

# 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"> <li>Scan report and submit via the FYPMS</li> </ul>	Report #1 Report #2 Report #3	<input type="checkbox"/> Oct <input checked="" type="checkbox"/> Nov <input type="checkbox"/> Dec/Jan	
Progress: <ul style="list-style-type: none"> <li>List the work completed in this reporting period.</li> <li>Identify the major difficulties encountered.</li> <li>Comment on the overall progress.</li> </ul>	<ol style="list-style-type: none"> <li>Literature review               <ul style="list-style-type: none"> <li>Reviewed papers on Travel Speed Estimation (TSE) for inferring ground truth fuel consumption data.</li> <li>Reviewed papers on map-matching algorithm for reconstructing urban network (redefine nodes and edges in graph).</li> </ul> </li> <li>Preprocessing: derivation of ground truth fuel consumption data               <ul style="list-style-type: none"> <li>Proposed 3 approaches to infer the underlying fuel consumption pattern.</li> <li>Challenge lies within the sparseness of the fuel consumption data as percentage of road coverage at each time interval is less than 50%.</li> <li>Implementing a matrix factorization method from a previous work to infer missing values in the fuel consumption data.</li> <li>Preprocessing work will be done after complete derivation of the ground truth data.</li> </ul> </li> <li>Graph construction               <ul style="list-style-type: none"> <li>Previously proposed a multi-graph approach, in which three graphs are to be constructed to incorporate different temporal and spatial features.</li> <li>The POI graph is completed as all nearby POI data points from OpenStreetMap are extracted and transformed.</li> <li>Currently constructing the speed similarity graph with Dynamic Time Warping algorithm to capture the temporal traffic flow pattern.</li> <li>The neighborhood graph is to be constructed after reviewing more map-matching algorithm to better encode; concept of supersegment by Deepmind was previously proposed for this project, but details of the work are not disclosed. Alternative approaches might need to be reviewed.</li> </ul> </li> <li>Define baseline model               <ul style="list-style-type: none"> <li>Shortest path algorithm is proposed as the baseline model.</li> <li>Data model from OpenStreetMap is used directly, without redefining the graph structure for the road network.</li> </ul> </li> <li>Overall progress               <ul style="list-style-type: none"> <li>Preprocessing work is slightly behind schedule due to the challenges in deriving the ground truth fuel consumption data.</li> <li>However, work on multi-graph construction and baseline model are ahead of schedule.</li> </ul> </li> </ol>		
Future Plan: <ul style="list-style-type: none"> <li>Write down the working plan</li> </ul>	<p>Following milestones are to be achieved before end of December</p> <ol style="list-style-type: none"> <li>Complete implementation of the matrix factorization algorithm so that ground truth fuel consumption data is ready for baseline model prediction</li> <li>Review map-matching algorithm and construct neighborhood graph</li> <li>Implement shortest path algorithm for the baseline model</li> </ol> <p>Upon completion of the work abovementioned, remaining time of the project will focus on designing the novel temporal graph neural network (T-GNN).</p>		

Supervisor's Comments:	<ul style="list-style-type: none"> <li>• The student reviewed critically related works and figured out their gaps.</li> <li>• She listed concrete challenges faced during the research, most of which are related to limitations in the dataset.</li> <li>• She managed to state a clear and promising research problem and come up with a concrete methodology to address it.</li> <li>• Her progress is almost in alignment with the planned schedule.</li> <li>• The ground truths need further investigation to come up with a better plan for the evaluation phase. <ul style="list-style-type: none"> <li>○ Explore mathematical models considering fuel efficiency in pathfinding</li> <li>○ Eventually review more complex solutions based on NN</li> </ul> </li> </ul>		
Supervisor's Overall Evaluation:	<div style="display: flex; justify-content: space-between;"> <span>(please circle)</span> <span>(letter grade)</span> </div> <div style="display: flex; align-items: center; 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;">A</div> <div style="border: 1px solid black; padding: 2px 5px; border-radius: 50%;">A+</div> </div>		
Meeting Date & Time:	27 Nov 2020 5pm		
Group Representative's Signature:		Supervisor's Signature:	