THE UNIVERSITY OF SYDNEY

FACULTY OF ENGINEERING

Engineering Vacation Research Internship Program

PROJECT MANAGEMENT RESEARCH PROJECTS FOR WINTER 2023

DIGITAL SCIENCES INITIATIVE PROJECTS FOR WINTER 2023

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PROJECT MANAGEMENT RESEARCH PROJECTS

PROJ2023/1 Projects associated with the housing market in the face of climate change

Supervisor: Dr. Nader Naderpajouh

Eligibility: WAM>80 and Undergraduate candidates must have already completed at least 96 credit points towards their undergraduate degree at the time of application.
Data analytics skills are preferred but not required.

Project Description:
Climate change is amplifying the frequency and severity of climate-related disasters. This increased risk can adversely impact the housing market, such as increasing the housing costs forcing a portion of the homeowners to terminate their ownership or pressuring low-income families into moving to sub-standard housing. In response to this risk, it is imperative to develop projects mitigating the adverse effect of climate change on the housing market and households. In this research, the student will conduct a review of the literature to gain a better understanding of how projects are defined in the housing sector and if the student has simulation skills, they will model behaviour of the housing market.

Requirement to be on campus: Yes **dependent on government's health advice*

PROJ2023/2 AI-based approach for centrality estimation in bipartite networks

Supervisors: Dr Shahadat Uddin and Prof Jinman Kim

Eligibility:

1. Simulation and/or computational modelling (Machine learning and preferably Deep learning)
2. Strong expertise in Python or a relevant programming language
3. Strong analytical minded

Project Description:
Extracting node-level network features is challenging in the training-test split for graph-based AI classifications, especially for large ones projected from a bipartite network. This project aims to develop AI-based models to estimate node-level features for a newly entrant node into a bipartite network without conducting a network-level analysis. This project will use open-access network data. The expected outcome of this project is predictive models for node centrality estimation, which will significantly reduce the computational complexity of any deep learning environment requiring node-level network attributes as input.

Requirement to be on campus: Yes **dependent on government's health advice*

PROJ2023/3 NLP (Natural Language Processing) to understand the landscape of Project Management research

Supervisors: Dr Shahadat Uddin and Prof Jinman Kim

Eligibility: Natural language processing and machine learning, Strong expertise in Python or a relevant programming language, Strong analytical minded

Project Description:
This project will employ suitable NLP methods related to topic modelling and word association (e.g., word2vec and BERT) to explore the landscape of Project Management (PM) research. For this purpose, it will primarily use bibliometric metadata from multiple sources. The project is expected to outline the PM research trend – quantitatively, linguistically and visually.

Requirement to be on campus: Yes **dependent on government's health advice*

PROJ2023/4 Advancing Project Stakeholder Analysis

Supervisor: Associate Prof Ken Chung

Eligibility: Distinction average, strong data analytics skills (e.g., coding in Matlab and/or Python, R or other statistical packages) and written communication skills.

Project Description:
This project involves the study of project stakeholder analysis through a comprehensive review of the current stakeholder management literature. It also investigates non-traditional techniques and approaches for the analysis of project stakeholders.

Requirement to be on campus: No

DIGITAL SCIENCES INITIATIVE PROJECTS

DSI2023/1 Accelerated Real-Time Image Processing Pipeline for Embedded Systems on Marine Robots

Supervisors: Dr. Stefan Williams, Dr. Gideon Billings

Eligibility: Coding proficiency (preferably C++), Experience with ML libraries like TensorFlow is a plus

Project Description:
The aim of this project is to develop an accelerated image processing pipeline, tailored for underwater scenes and capable of operating at real-time framerates on embedded systems. The project would explore the use of a Google Edge TPU combined with an NVIDIA Jetson device to accelerate an image feature encoding network that would pipe into a GPU accelerated feature extraction and matching stage. This accelerated image processing pipeline will be the backbone for visual methods, such as Simultaneous Localization and Mapping, semantic segmentation, and object detection, that will run onboard underwater vehicles.
The student will explore machine learning models that are optimized for edge devices in conjunction with GPU accelerated feature descriptors to determine a processing pipeline that balances computational performance and accuracy.

Requirement to be on campus: Yes **dependent on government's health advice*