What has been done

Research topic

Forecasting the Ammonia Concentration in the Reclaimed Water using Machine Learning.

2021 Sep & Oct

- 9/21 – Progress report
  - Using manually collected data to forecast NH_3N.
  - Train model with DO, colour, etc.
- 9/30 – Finish setting up colour spectrophotometer.
- 10/5 – Install colour photospectrometer on-site in SHW.
- 10/12 – Complete photospectrometer introduction video.
- 10/22 – Work with Zhao Jing (ML models training).

2021 Nov & Dec

- 11/29 – Group presentation
  - Use RF, DNN, and LSTM models to forecast ammonia.
  - Models were trained with different input size and with or without data smoothing filter.
  - Ammonia data was collected in May and June.
- 12/15 – Confirm thesis outline structure with Dr. Yin.

2022 Jan & Feb & March

- 1/21 – Group presentation
  - Use 5 more models to forecast ammonia.
  - Introduce a new data smoothing filter and outlier removal method to perform data cleaning.
  - Ammonia data was collected in Nov and Dec.
- 2/21 – Progress report to Dr. Yin (to confrim the ACS abstract content).
- 2/25 – Last day of calibrating colour spectrophotometer in SHW.
- 3/10 – Submission of ACS abstract.
- 3/18 – Finalize the coverage of my research works.

Future plan

April & May

- 4/22 – Finish MPhil thesis 1_{st} draft.
- 4/22 – Group presentation.
- 5/11 – EVNG 6050X presentation.
- 5/27 – Finish MPhil thesis 1st revision.
  (Start to shcedule time for oral defense)

June & July

- June – Preparing for oral defense
- Jul – Oral defense

Research plan in Spring semester, 2022	Feb		Mar				April					May		Jun	Jul
	18	25	4	11	18	25	1	8	15	22	29	13	27	30	31
ACS abstract submission (ddl 3/14)															
Finalizing methodology for NH3-N and colour forecasting															
Summarize results															
Drafting abstract for ACS fall conference															
Complete MPhil thesis (ddl 5/27)															
Finalize my research work															
Finish MPhil thesis 1st draft															
Prepare MPhil seminar presentation (present date: 5/4 or 5/11)															
Finish MPhil thesis 2nd draft															
Oral defense (mid Jun ~ mid Jul)															
Preparing for oral defense															
Tentative oral defense time (mid Jun ~ mid July)															
Thesis submission															

Progress report

Key findings in Feb and March

- Train ammonia forecasting model with colour data decreased the model performance.
- Feature enginnering was applied to increase the model performance, and the improvement of the model can be explained in engineering perspective.
- New state-of-the-art model (Transformer) was used and a better model performance was achieved compared to LSTM and DNN.