

IE5400 Healthcare Systems Modeling and Analysis

Project Instruction and Policy

Spring 2021

Instructor: Chun-An Chou

Instruction

- Students are required to conduct a term project in the semester.
- Project Topics include: (Pick one)
 1. Predictive optimization of unplanned ICU transfer in emergency department
 2. Predictive modeling and analysis of ICU admission
 3. Resource allocation of emergency medical services
 4. Operations and capacity simulation for COVID-19 pandemic
 5. Your own topic/idea. Feel free to discuss the feasibility with the instructor.
- To complete you project, you are allowed to work as a group of no more than 3 members.
- Necessary components must be included in the project:
 - ✓ **Paper Review**
 - This is not a teamwork. Each member needs to review 2 technical papers (including the provided paper) and write a 1-page paper review by using the given template.
 - The technical papers reviewed must be from high-impact research journals, e.g., Health Care Management Science, IIE Transaction on Healthcare Systems Engineering, Operations Research for Healthcare, etc. Note that conference papers are not acceptable for your paper review except for ones with a low acceptance rate (e.g., IEEE EMBC).
 - ✓ **Tasks Implementation**
 - Must complete the required tasks (see the project description). More creative tasks will be welcomed.
 - ✓ **Project Presentation**
 - Each team must make a 12-minute presentation in class. Note that over-time presentation may affect your grade.
 - Students must explain the implementation in detail.
 - Presentation Date: 4/15.
 - ✓ **Written Report**
 - A 6-page written report is required by following the given template, together with 1 page paper review report from every member. That is, each team must submit 9-page report plus reference lists.
 - It must include the detail of what you implement and analyze. Note that codes are not considered as part of reporting.
 - Referred papers must be cited in the report.

Submission (on Canvas)

- Submit the hardcopy of written report (in pdf) **due at the presentation days (5 pm)**.
- Submit a single compressed file (including all files of papers, data, codes, results, etc.).

Grading Policy

- 25% in total for each term project: 5% for individual paper review report and 20% for teamwork (implementation, presentation, and written report).
- Project (including paper review, implementation, presentation, and written report) will be evaluated and graded by the instructor.
- **Late submission is not acceptable.**

Project 3: Resource Allocation of Emergency Medical Services

Required implementation tasks.

- You will perform data cleaning, data analysis, and data visualization to understand the Emergency Medical Services (EMS) dispatch in New York City.
 - How EMS was affected in the early period of the epidemic: March 1st to April 30th, 2020 (What variables have changed due to the epidemic and how they changed? What is the relationship between the point in time recorded during the ambulance trip and the final outcome of the accident? What is the relationship between the dispatch area and arrival location?)
 - Visualize the geographic areas, and the average number of daily EMS dispatches in New York City.

- You will build an optimization model to allocate EMS resources at the beginning of the epidemic (March 1st to April 30th, 2020).
 - You need to calculate three ways to measure the travel-time that between the time the first ambulance is assigned and the time ambulance has arrived at the incident location.
 - Median travel time in 2020.
 - Median travel time in 2019.
 - Estimated travel distance by zip code.
 - You need to use the ambulance dispatch route in 2020 as the availability of the dispatch route.
 - You need to calculate the ambulance daily demand for each dispatch area.
 - You need to use the maximum daily number of ambulance dispatches in 2020 as the maximum allocation threshold for each dispatch area.
 - You need to calculate the median number of ambulances daily dispatched for each dispatch area from 2015 to 2019. You will use it as the regular dispatch and compare it with the results of the optimization model.
 - You need to compare the results of the optimization model with the actual dispatch.