Independent Study Proposal

Optimization of Airport Surface Planning and Scheduling
12 Units, Spring 2018

Student	Advisor	Mentor
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Introduction

This study is an extension of a MSIT Practicum Project, "NASA: Optimization of Airport Surface Planning and Scheduling" which was sponsored by NASA in 2017 Fall. In the Practicum Project, we introduced planning and scheduling in the context of real-world uncertainty and created a generic airport simulation tool (ASSET2) that is easily extensible to different scenarios and airports. We also explored different auto-scheduling methods to compare with current FCFS method, and, created an uncertainty-aware scheduler which produces roust schedules with simulated uncertainty. Lastly, we built an uncertainty module to model real-word uncertainty and evaluate the robustness of scheduler in light of different scenarios. The work is open sourced at https://github.com/heronyang/airport-simulation.

For this independent study, we plan to continue the practicum project and aim to publish a paper on analyzing the relationship between tightness and performance factors of a scheduler: we expect to see that a scheduler with low tightness brings better performance, vice versa. We have observed this pattern in our simple experiments, and it is planned to verify and run more experiments on this topic.

Also, we will study how uncertainty affects the decisions made by a scheduler on our self-developed tool, ASSET2. We've observed how different amount of uncertainty generates conflicts on an airport surface, and it's planned to implement a scheduler that refers to predictions with uncertainties generated by a simulator while scheduling. We expect to see a relationship between the uncertainty sensitivity and the real performance.

Reasoning

In the practicum project, we've successfully built a basic simulation allowing us to run experiments with different uncertainty, reschedule, and tightness variables. However, we still left many issues unexplored because of the time limitation. We plan to continue on studying the relationship between tightness and

performance of a scheduler, and gain a better insight to prove our original idea. Unlike general courses offered on campus, the study will mainly focus on one specific problem and guided by our partnered NASA researcher.

Expected Timeline

01/22 - 01/28	Preparation
01/29 - 02/11	Explore Research Topic & Define Problem to Solve
02/12 - 03/11	Experiments & Code Development
03/11 - 03/18	Mid-point Presentation
03/19 - 05/08	More Experiments & Paper Writing

Deliverable and Evaluation

The study will be graded by Corina Pasareanu and mentored by NASA researcher, Robert A. Morris, who was also our practicum mentor. Weekly meetings of this study will be held. I will be responsible for researching the topic, developing related code for experiments, delivering mid-point presentation and the final paper for grading.

Grading details are listed below:

Code	20%
Mid-point Presentation	30%
Paper	50%

Student (Applicant)
Hsiang Yu (Heron) Yang

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(Date / Signature)

Advisor
Corina Pasareanu

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(Date / Signature)