Master Thesis Proposal

Solution Methods for Integrated Airline Schedule Planning

The planning of an airline’s schedule poses daunting challenges as it involves various interdependent operations decisions, ranging from short-term to more strategic type planning problems: which origin-destination markets to serve at what frequency and departure times, over which routes, what aircraft type and which crew to assign to each of these flights, etc. Airlines successfully rely on sophisticated decision support tools for schedule planning that, due to complexity, typically decompose the whole schedule planning process into these sub-problems that are solved sequentially. On the other hand, various approaches have been developed in the more recent scientific literature that integrate two or more sub-problems in order to achieve better solutions. These integrated problems are difficult to solve and their solution requires special solution techniques that are capable of approximately solving real-world instances in acceptable time.

The objective of the thesis is to

- give an overview of the airline planning process at the strategic, tactical, and operational level,
- review integrated models in the literature integrating schedule design, fleet assignment, and other planning problems,
- present and discuss solution methods such as Benders decomposition, column generation, and suitable heuristics to solve these problems,
- implement a base model in AMPL and perform and experimental performance analysis of different solution methods.

Sound Operations Research and programming knowledge is required.

Recommended Basic Literature


and the literature cited therein