

# AIRLINE PLANNING ALGORITHM

Oleguer Canal - Fernando Garcia - Federico Taschin - Catherine Weldon

KTH - Royal Institute of Technology



## Future Work

### 1 Solution Improvements

The formulation of this routing problem has a very high branching factor and complexity level which makes it difficult to apply to real-world scenarios.

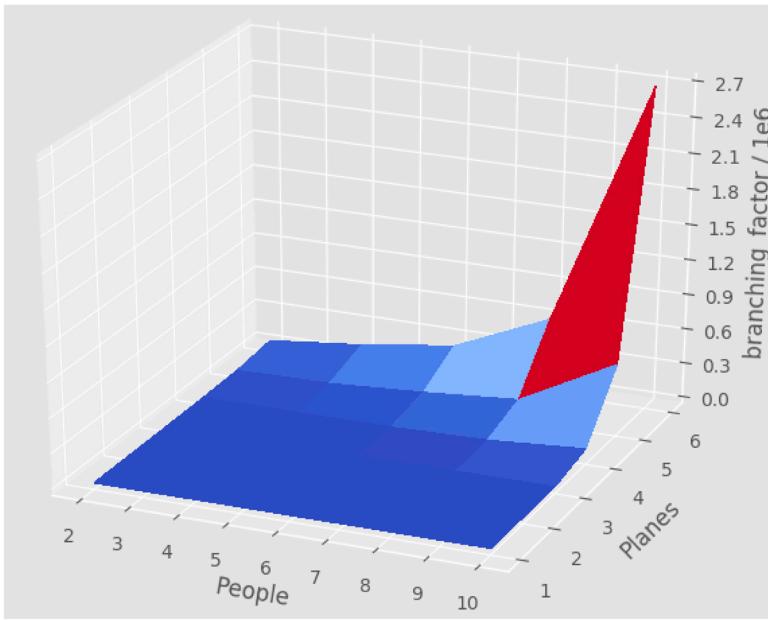


Fig. 1: Problem 2 Branching Factor as a function of Passengers and Planes

Scalability in the Vehicle routing problem, which is NP-hard, is currently an unsolved problem. To manage this branching factor and allow for increased scalability, the next steps would be to implement the following:

- Different heuristic algorithms such as the Clarke-Wright Algorithm [12] which is commonly implemented in the VRP to find quicker feasible solutions
- Deep Q Learning with Reinforcement Learning [11] to optimize the learning time

Both of these solutions would limit the branching factor and allow for solving larger problems.

### 2 Additional Considerations

To transform this problem to real world data, there are additional constraints that could be explored. These variations include the following:

- Adding costs, such as fuel, maintenance, crew, taxes
- Adding stochasticity for delays or equipment malfunctions
- Modeling competing airline routes to understand how the increase in supply would impact ticket prices
- Taking into account the optimal scheduling of flight crews
- Considering how seasonality impacts ticket prices

This additional data would increase the effectiveness of the plan, transforming it to a real-world solution.

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