Problem

- Dance line
- ▶ Some dancers want to be close, others apart
- Try to find optimal permutation
- ▶ Problem is hard O(n!)

Methods

- Classic local search
- ► Variable Neighbourhood Search
- Memetic algorithm

Local Search and VNS

- Local search is a special case of VNS
- Multiple restarts
- ► Tend to get stuck in local optimum

Local Search and VNS

Neighbourhoods used:

- Swap two neighbours
- Split the permutation into two parts and swap them
- Swap two elements in the permutation
- Choose a part of the permutation and reverse it
- Combinations of above

Memetic Algorithm

Based on a simple genetic algorithm.

- Selection:
 - ► Two variants of Roulette wheel selection
 - Deterministic tournament selection
 - Truncation selection
 - Tournaments selection
 - Hybrid approach
- Ordered crossover
- Mutation

Memetic Algorithm

Additional improvements:

- ▶ Local search with limited number of steps after selection
- ▶ Local search before returning the result

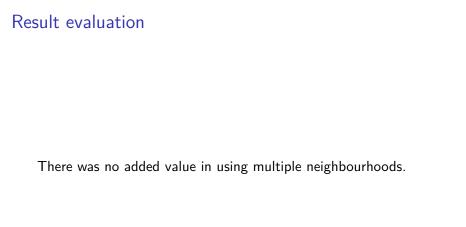
Results on DS3.csv

► Local search: 1992

► VNS: 1985 ► MA: 1992



Local search worked well because it's simple and fast.





MA works well, but is very slow and sometimes unpredictable.

Possible improvements

- Faster language?
- More careful parameter selection for MA?
- ► Finding some other neighborhood?
- Replacing VNS with a different algorithm?

Questions