

Evaluation and Comparison of Scheduling Strategies for the Scheduling of Electric Vehicles at Capacity-Constrained Charging Stations

Ashkan Amouzandeh (a.amouzandeh@student.tudelft.nl) - Supervisor: Valentin Robu (v.robust@cwi.nl)
Delft University of Technology - CSE 3000



1 - Background

- **Electric vehicles (EVs)** have experienced a **rise in popularity** in the past few years.
- Their popularity is also expected to increase in the foreseeable future.
- This can lead to **congestion at public charging stations** because EVs take a long time to charge.

2 - Contribution

- This work studies **candidate scheduling strategies for scheduling EVs** at an individual charging station.
- Through experimental analysis, we conclude **which strategy is the best suited for which performance criterion**.



3 - Scheduling Strategies

- Through extensive **simulations**, the **efficacy** of the following strategies and their extensions is studied:
 - First come first serve (FCFS)
 - Earliest deadline first (EDF)
 - Least laxity first (LLF)
 - Shortest job first (SJF)
- The following **performance metrics** are considered:
 - Average waiting time
 - Maximum tardiness
 - Average tardiness

5 - Conclusion

- **EDF** is the best alternative for **adhering to deadlines**, resulting in 83% lower average tardiness compared to FCFS.
- **SJF** is the best alternative for **minimising waiting times**, lowering waiting times by 29% compared to its counterparts.
- No performance difference exists between LLF and LLSJF or between EDF-pre and EDSJF
- LLF and LLSJF perform slightly worse than comparable alternatives when waiting time are considered.
- Preemptive EDF performs 9% better than EDF. On the other hand, preemptive SJF does not perform better than SJF.

4 - Results

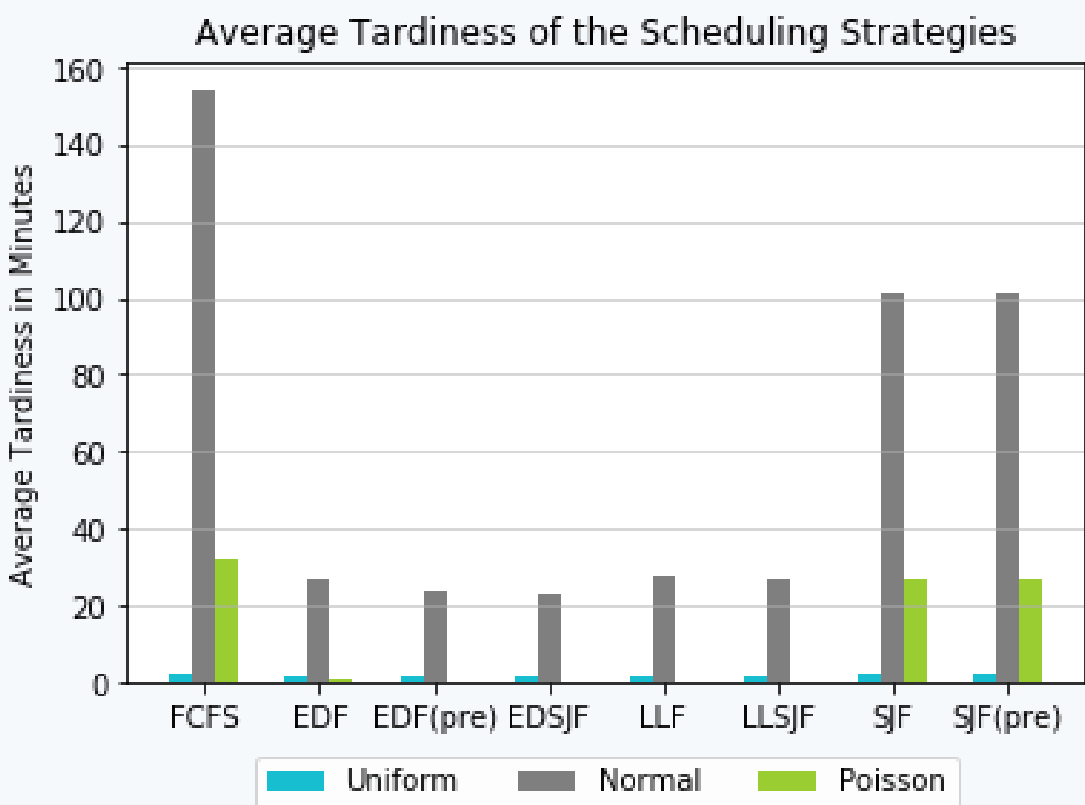


Figure 1: The average tardiness of the scheduling strategies under three arrival probability distributions

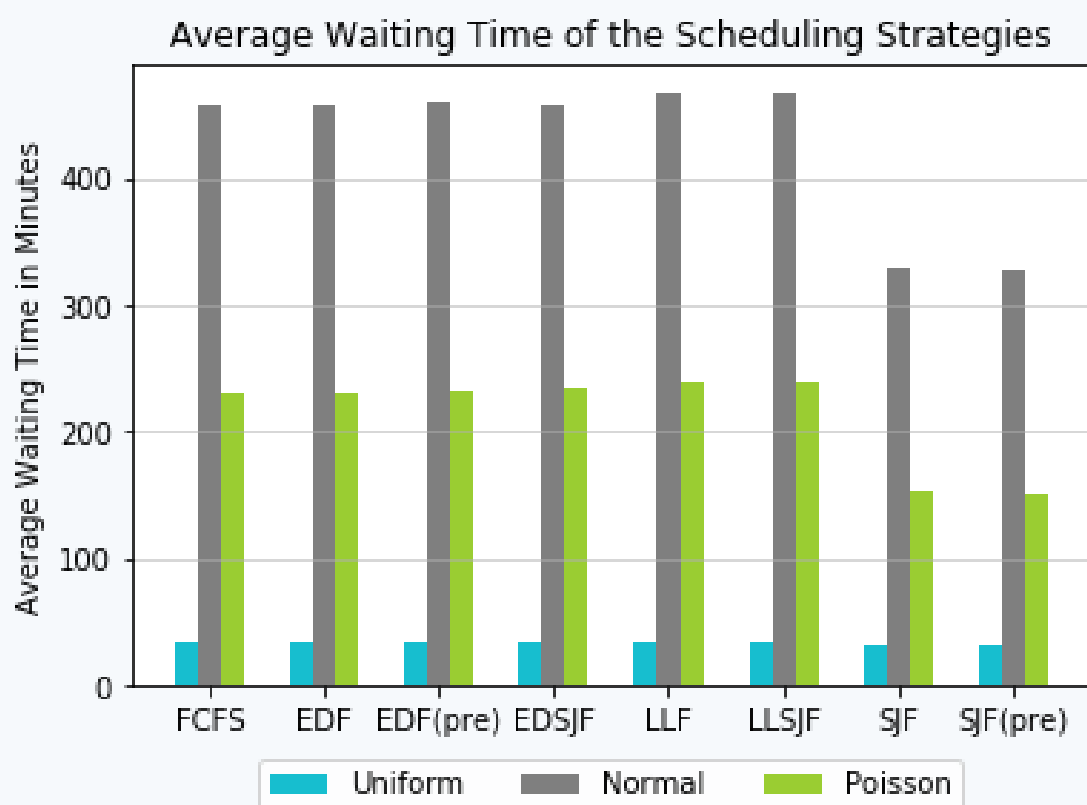


Figure 2: The average waiting time of the scheduling strategies under three arrival probability distributions

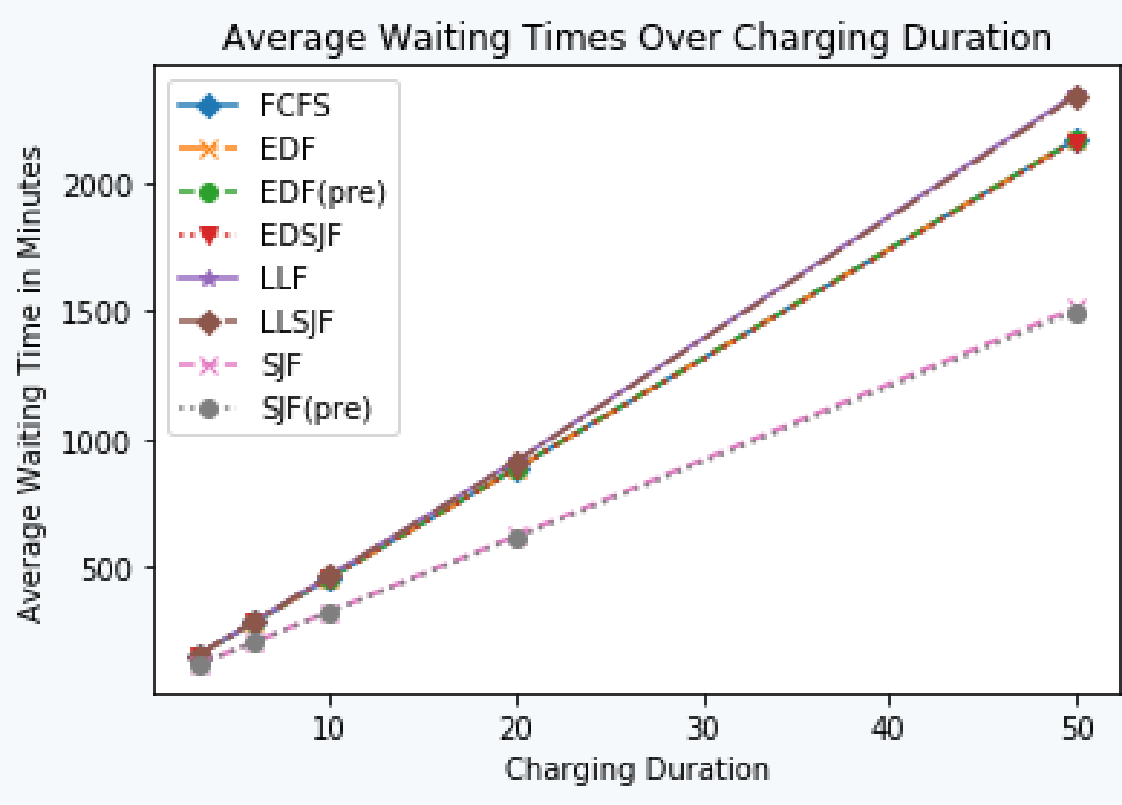


Figure 3: The average tardiness of the scheduling strategies under varying charging durations