Multi-objective Evolutionary Algorithms for the Electric Vehicle Charging Stand Infrastructure Problem

During the last decades, electric mobility is gaining importance as an alternative to vehicles powered by fossil fuels, with a strong tendency toward its widespread implementation. Electric vehicles (EVs) offer several benefits, including reducing gas emissions, lowering noise pollution, and providing energy efficiency. In addition, electric mobility can take advantage of clean energy sources such as solar, wind, or hydropower, thus reducing greenhouse effects. Still, the population has yet to adopt the use of EVs widely. One of the main reasons for this is the lack of charging infrastructure.

The number of charging stations, as well as the location and capacity that guarantee the charging availability, is essential to ensure the massive use of EVs. Then again, simply increasing the number of stations is challenging due to the high installation cost. Thus, the decision maker must consider practical requirements like the location, charging time, power consumption, and space to install charging stations at appropriate places. However, reliable estimation of the optimal position and size of the charging infrastructure is a difficult task, and the final decision may vary based on real-world demands. Therefore, installing the charging infrastructure in an appropriate location leads to time, economic, and energetic efficiency and should be formulated as a multi-objective optimization problem (MOOP). This project aims to implement several recent multi-objective evolutionary algorithms (MOEAs) to solve this practical problem to justify and test the performances of several recent MOEAs.

Required Skills: Background in artificial intelligence and machine learning techniques, Knowledge on Bio-inspired Algorithms, Experience on implementing ML techniques using Python.