Shell.ai Hackathon

for Sustainable and Affordable Energy

EV Charging Network Challenge Problem Statement

powered by Microsoft UDACITY

shell.com/hackathon

Shell.ai Hackathon for Sustainable and Affordable Energy

EV Charging Network Challenge: Problem Statement

Introduction

The mobility sector accounts for around 18% of the carbon dioxide emissions from burning fuel[1]. A considerable market share of electric vehicles (EVs) running on clean power is key to mobility decarbonisation. As the number of EVs on our roads continues to increase, the demand for charging is following suit. Today around 10% of drivers are choosing EVs when buying a new car, and this is expected to grow rapidly[2]. We need accelerated technology and infrastructure development to support EV market growth.

While EV drivers are looking for a charging experience that is as fast and comfortable as possible, the main obstacle to mobility decarbonisation is inconvenience caused by charging infrastructure and charging time[3] Proper placement of charging points can alleviate this problem. It is a subject of current research and business interest simultaneously and has immense implications for the adoption of EVs, including:

1. lowering range anxiety among EV owners,
2. optimal utilisation of EV charging points,
3. minimal travel time and waiting time for EV owners.

In addition, the challenges around this problem are evolving as EVs penetrate different geographies. For example, the EV charging placement in a U.S. city has different nuances than in a suburban town in India.
The demand for solving this problem at different geographies and scales will increase exponentially in the next decades as EVs spread from cities and urban areas to villages.

---

[1] https://www.iea.org/topics/transport
[2] https://www.iea.org/data-and-statistics/data-product/global-ev-outlook-2022
[3] https://www.shell.com/promos/motorists/decarbonising-mobility-together-we-drive-change/_jcr_content.stream/1644314678955/bce5d350bceac29f652046eb352c3514edf76b52/decarbonising-mobility-report-december-2021.pdf

Challenge

In Shell.ai Hackathon 2022, we challenge you to optimally place EV charging stations so that the configuration remains robust to demographic changes. You will need to forecast demand in the coming years and place chargers optimally to meet the demand and increase customer satisfaction. Your solution should meet a few practical constraints, such as demand-supply balance. We will provide the constraints in the detailed problem statement.

Data

We will provide the following data:

1. a time-series of EV charging demand data over a region,
2. a set of parking locations with respective parking capacity/slots, i.e., potential EV charging points within the region,
3. details of the existing EV infrastructure,
4. the cost of charging point installations and operations,
5. other data related to power constraints, rate of charging of fast & slow chargers.

We will ask you to forecast the EV charging demand and required infrastructure over the next two years. Your solution will be eligible for ranking if it satisfies the constraints. The ranking will be based on the cost function provided in the detailed problem statement. We will keep the first year of your forecast for the public leader board. You can test your solution any time and see how it ranks. We will keep the second year of your forecast for the private leader board and use it to determine the finalists.