



Impact of Electric Vehicles on Power Distribution Systems



Abstract

The market for battery powered and plug-in hybrid electric vehicles is currently limited, but this is expected to grow rapidly with the increased concern about the environment and advances in technology. Due to their high energy capacity, mass deployment of electrical vehicles will have significant impact on power networks.. This paper presents the results of an analysis of the impact of electric vehicles on existing power distribution networks. Evaluation of supply/demand matching and increased demand of electricity on substation will be presented here.

Keywords: Distributed systems , Battery electric vehicles (BEV), Electric Vehicle Supply equipment (EVSE),Demand supply , Machine learning(ML),2W(two wheelers)

Introduction:

We are worried about a global concern which is making the existence of every species harder day by day i.e. POLLUTION . Major sources of Major sources of air pollution include inefficient modes of transport ,the world reserve for fossil fuels will last for only 50-60 years. To get control of this issue the transition to electric mobility is a promising global strategy for decarbonizing the transport sector. An accessible and robust network of electric vehicle(EV) charging infrastructure is an essential pre-requisite to achieving this ambitious transition. A contextual approach is needed to ensure the efficient and timely implementation of EV charging infrastructure ,such that it meets local requirements and is optimally integrated within the electricity supply and transportation networks.

Electrical vehicle supply equipment(EVSE) is the basic unit of EV charging infrastructure .

Problem Statement:

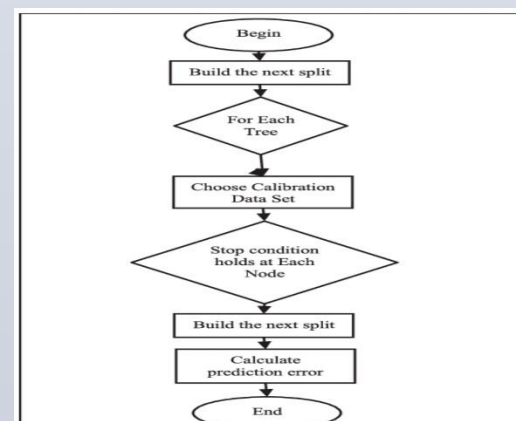
widespread adoption of EVs has the potential to significantly impact the distributed systems in several ways , as it effects the supply-demand matching and strain on substation. Using machine learning we are going to asses and predict the effect of electric vehicles on our distribution system by 2030 if 80% of the vehicles are replaced with the electric vehicles in our institute by integrating the load of charging station on distribution system

Objectives:

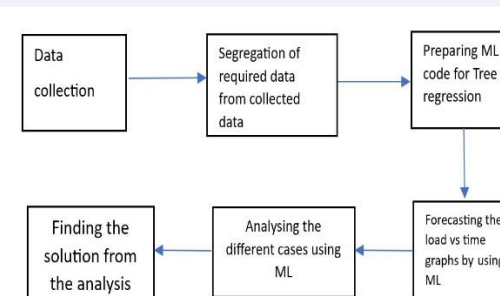
- Identifying the peak time of the load using machine learning.
- Studying the nature of load curve using machine learning.
- Finding the pattern for the increased demand of electricity on substation.

Proposed Methodology:

Machine learning



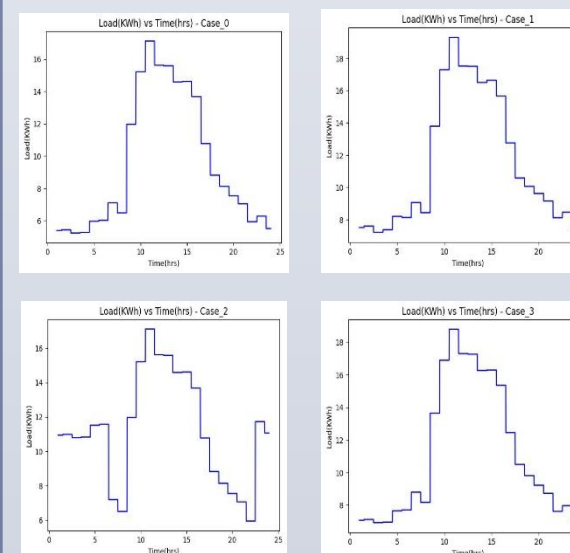
Block Diagram:



Result:

The increased demand of electricity on sub station can be solved by load balancing and can be analyzed by three scenarios . They are

- 1.Uncontrolled domestic charging
- 2.Off-peak domestic charging(12am-6am)
- 3.SMART charging : The EV loading can be split into 4 schedules of (load vs time graphs)



load vs time graphs (different scenarios)
The demand profile can be made more uniform by phasing of charging schedules using Scenario 3.

Conclusions;

The investigation presented in this paper showed that large deployment of EVs could results in violation of supply/demand matching. Under certain operating conditions, they may also lead to power quality problems.

India is among a handful of countries that support the global EV30@30 campaign, which targets to have at least 30% new vehicle sales be electric by 2030.

Here in NIT AP using machine learning we are going to asses and predict the effect of electric vehicles on our distribution system by 2030 if 80% of the vehicles are replaced with the electric vehicles in our institute by integrating the load of charging station on distribution system.

References

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