INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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SHORT ABSTRACT

The ever increasing energy demand accompanied by fossil fuel depletion and environmental degradation has paved the path of transportation electrification. Electric Vehicles (EVs) are environmental friendly alternative to conventional Internal Combustion Engine (ICE) driven vehicles. For large scale deployment of EVs sustainable charging infrastructure needs to be developed. The charging station placement problem is a complex problem involving power distribution network and road network. Charging stations must be placed in the distribution network in such a way that the negative impact of placement of charging stations on the operating parameters of the distribution network is minimized. Also, the location of charging station must be optimized considering the route behavior of EV drivers and charging demand of the EVs computed based on the driving range of the EV. Hence, motivated by all the aforementioned factors this thesis aims to delve into charging infrastructure planning for EVs. The thesis proposes single-objective, multi-objective as well as robust two-stage formulation of charging station placement problem. Moreover, hybridization of Chicken Swarm Optimization and Teaching Learning Based Optimization Algorithm (CSO TLBO) is proposed for solving the charging station placement problem. The proposed formulations of charging station placement problem are validated on superimposed 33 bus distribution and 25 node road network, city of Tianjin, and highway network of Guwahati.