Minor Project

STABILITY OF SMART GRID USING ANN

Presentation By

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Introduction

- Stable operation of complex flow and transportation networks of grid requires balanced supply and demand
- For the operation of electric power grids—due to their increasing fraction of renewable energy sources a pressing challenge is to fit the fluctuations in decentralized supply to the distributed and temporally varying demands
- Here we propose a Decentral Smart Grid Control, where the price is directly linked to the local grid frequency at each customer

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The increasing fraction of renewable energy sources presses challenges to fit the fluctuations in decentralized supply.

<u>To achieve this goal concept of Smart Grid is introduced</u>

- **Collect consumer demand data, Centrally evaluate them**

- **Given current supply and send price information back to customers for them to decide about usage**

- In a future, fully renewable grid the consumers could take over this role and regulate their demand autonomously on the basis of the grid frequency.

- To make this economically favorable, it was proposed that the price of electric energy for each local consumer is a direct function of the local grid frequency

Datasets

Datasets has been taken from University of California, Irvine (UCI) Machine Learning Repository, where it is currently hosted, datasets comes from simulation.

It contain 10,000 observations and 12 primary predictive features and two dependent variables. With an objective to predict Stability of smart Grid.

Predictive Features

- tau1 to tau4: the reaction time
- p1 to p4: nominal power produced
- g1 to g4: price elasticity coefficient

Dependent Variables

- Stab - positive or negative values
- Stabf - categorical label (stable or unstable)

Summary

We predicted the stability of the Smart Grid using decentralized approach with the help of Artificial Neural Network Model.

Using deep learning we got the significant high prediction accuracies, which signifies that Deep learning can be employed for this particular application of predicting stability of Decentralized Smart Grid.

We further plan to implement more Deep learning model and further explore and find theirs accuracy.

References

- Datasets - https://archive.ics.uci.edu/ml/machine-learning-databases/00471/
- Taming instabilities in power grid networks by decentralized control" (B. Schäfer, et al, The European Physical Journal.
- Decentral Smart Grid Control Benjamin Schäfer, Moritz Matthiae, et al,