Electricity Consumption Prediction

Holon Institute of Technology students project

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Purpose of the research

Commercial electricity users in Ukraine are required to state how much electricity they are going to use in each following month and buy it accordingly. However, if they don't use all of it, they practically lose money. On the other hand, the fee for excessive usage is twice(and sometimes three times) than the regular fee by the law. According to recent statistics, AWDP increased to UAH 585 per MWh in 2015.

As a result, these users are seeking the most accurate estimation(or prediction) of the following month's usage. Hence, this study's aim is to predict, with at least 95% accuracy, the electricity usage of commercial entities.

To achieve this kind of accuracy, this research will include Machine Learning algorithms that would take into account various factors that could affect the power consumption, such as: weather conditions, factory machines' power usage, etc.

Algorithm selection

| Algorithm	Mean Absolute Error	Mean Squared Error	Root Mean Squared Error	R2 Score Error
Linear Regression	0.2797111153652	0.3358540598436	0.5795291708306	0.0726181624881
Decision Tree	0.0721798853649	0.0921125193761	0.3035004437824	0.7456529853571
Lasso Regression	0.2707442647546	0.3438501679392	0.5863873872613	0.0505387943777
Random Forest Regressor	0.0622560891443	0.0591386011296	0.2431842945785	0.8367026898258

As seen in the table, Random Forest Regressor algorithm yields the best results

Random Forest

Random forest is a supervised learning algorithm. It builds a forest with an ensemble of decision trees. It is an easy to use machine learning algorithm that produces a great result most of the time even without hyperparameter tuning.
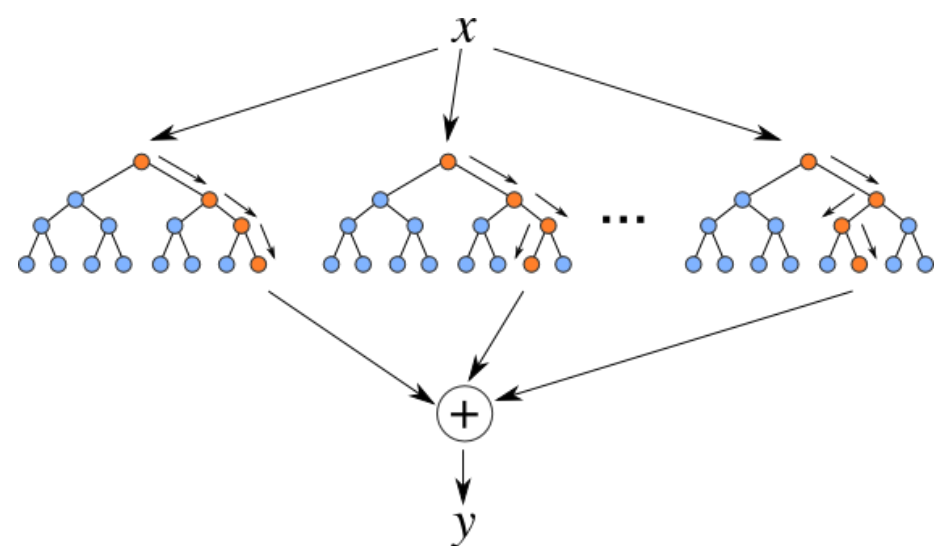
Random Forest results:

Test result
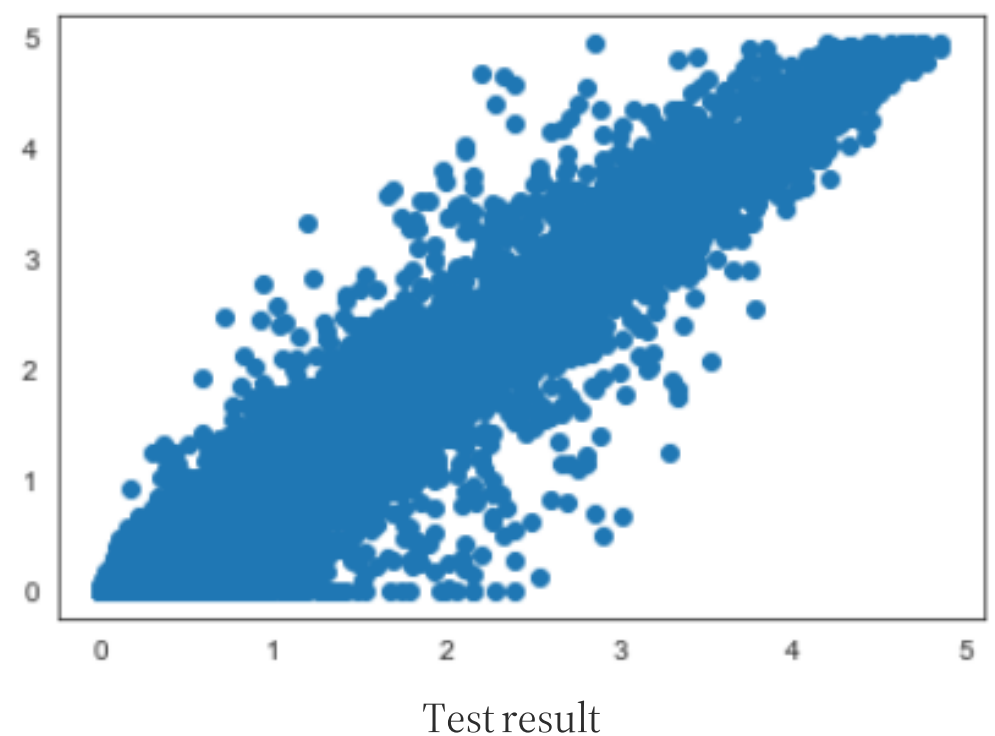
	r2_score	MAE	MSE	RMSE
0	0.841274	0.061672	0.057483	0.239757
1	0.840083	0.061713	0.057914	0.240654
2	0.839448	0.061800	0.058145	0.241132
3	0.839565	0.061734	0.058102	0.241044
4	0.838819	0.061673	0.058372	0.241603
5	0.840926	0.061537	0.057609	0.240019
6	0.841347	0.061450	0.057457	0.239701
7	0.839990	0.061612	0.057948	0.240724
8	0.839853	0.061725	0.057998	0.240827
9	0.840154	0.061814	0.057889	0.240600

Random Forest train result