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An Overview on Various Applications of Deep Learning

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ABSTRACT: Machine-learning algorithm called Boosted Regression Trees, which is the core of methodology for the early detection of problems. The method includes some criteria to determine if the discrepancy between predictions and observations is normal, to calculate the realistic estimations of the model accuracy and to recognize extraordinary load combinations. Performance of non-causal and causal models is assessed to find anomalies and at the end, final method was implemented to check and verify the results for the decision making.

I. INTRODUCTION

- Big Data

Today with the very fast increase in the size of data, the application communicates big scope and metamorphic possibilities for the various sectors. It widely opens up the extraordinary demands to exploit data and information for this big data prediction and analytical solutions. Chen and Lin noticed and proposed that there are significant challenges in front of deep learning. These challenges are large scale, heterogeneous, disorderly labels, and non- static distribution and the requirement is to have transformation solutions. The challenges offered by big data were timely and provided many opportunities and searches for the deep learning. [2] presented that the deep learning of the Big Data analysis can produce remarkable results and helped in identifying the unknown and useful patterns with high level of abstraction which were impossible to understand.

- Stock Market Analysis

[4] proposed a method for the stock market prediction, analysis and precision by using data of US Apple stock ($3 \times \{2 - 15\} + 2$) and target output will be Stock price for 19,109 numbers of samples. They took the sampling period of 3 months and used deep neural network methods. For measuring the performance they used MSE and direc- tional accuracy measurements. [5] proposed a unique method of deep learning for the stock market analysis and prediction. From the input of stock returns, they per- formed the experiment with the three unsupervised meth- ods called Principal Component Analysis (PCA), Restricted Boltzmann Machine (RBM) and Auto-encoder for predicting the future market behavior. The dataset used to be Korea KOSPI 38 stock returns and target output produced would be Stock return to a number of samples 73,041 and sampling period is 4 years. They used deep neural network methods for measuring the performance. They used NMSE, RMSE, MAE, and Mutual Information (MI). From their study, they concluded that DNN perform better than a linear autoregres- sive model.

[6] presented an effective comparison and testing prediction capabilities of the various algorithms for modeling the dam behavior with respect to displacement and leakage. Models using the concepts such as boosted regression trees (BRT), random forests (RF), neural networks (NN), multivariate adaptive regression splines (MARS) and support vector machines (SVM) are employed to predict 14 target variables with the prediction of the accuracy as compared with the statistical models. BRT stood best as compared to the RF and NN. [8] presented a novel method of using promising machine learning techniques called Boosted Regression Trees (BRT) to handle four leakage flows and eight radial displacements at La Baells Dam. The goal was to explore the model interpretation, the impact of predictors was computed and the partial dependency plots were produced. The results were interpreted to draw the conclusion on dam response to the environment variables and its growth with time. Results showed that the method was working efficiently identifying dam performance and the variations with higher flexibility and reliability rate as compared to the simple regression models.

9. put in front the comprehensive survey showing the usefulness of machine learning algorithm for the analysis of dam structural behavior which is based on the monitoring data. From the survey several critical issues, accuracy rates associated with the algorithms, radial and tangential displacements, leakage flow were identified. The results of this survey concluded that BRT i.e. Boosted Regression Trees is the most perfect method in terms of accuracy, association among the variables and the response of the dam with effect of time. [12] presented a review on the statistical and machine learning based predictive models which are required for the dam safety analysis. They explored the state-of-

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the-art work with many aspects such as nature and kind of input variables, division into training sets and validation sets and hence performed the error analysis.

II. CONCLUSION

Review concluded that firstly, other than Hydrostatic Seasonal Time Model (HST), machine learning methods are more suitable for achieving accurate results, to represent non-linear effects as well as complex interactions in between input variables and the dam response. Secondly, the papers covered only one output variable with lack of validation data. Thirdly, engineering judgments based on the experiences are critical for constructing the model, for interpreting results and decision making for the dam safety.

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