International Journal of Multidisciplinary Engineering in Current Research - IJMEC
Volume 9, Issue 01, January-2024, http://ijmec.com/, ISSN: 2456-4265

CAR POPULARITY PREDICTION A MACHINE LEARNING APPROACH

Mohammad Althaf, Dr. Narsappa Reddy

[1]B.tech Student, Department of Electronics and Computer Engineering, J.B Institute of Engineering and Technology.

[2]Associate Professor & HOD Department of Electronics and Computer Engineering, J.B Institute of Engineering and Technology.

Abstract: Today is a world of technology with a foreseen future of a machine reacting and thinking the same as humans. In this process of emerging Artificial Intelligence, Machine Learning. Knowledge Engineering. Deep Learning plays an essential role. In this project, the problem is identified as a regression or classification problem and here we have solved a real world problem of popularity prediction of a car company using machine learning approaches.

In this paper, the problem is identified as regression or classification problem and here we have solved a real world problem of popularity prediction of a car company using machine learning approaches. Keywords—Machine Learning, Classification, Regression, Supervised Machine Learning, Logistic Regression, Random Forest , KNN.

I. INTRODUCTION

The problem addressed by the "Car Popularity Prediction using Machine Learning Approach" project stems from the complexity of predicting the popularity of cars in a dynamic and competitive automotive market. Traditional methods often fall short in accurately forecasting the factors that contribute to a car's popularity, such as consumer preferences, market trends, and technological advancements. This project aims to overcome these challenges by leveraging machine learning techniques to analyze diverse datasets and extract patterns that influence car popularity. By doing so, it seeks to provide valuable insights for automakers, marketers, and consumers in understanding the key determinants of a car's success in the market.

II. LITERATURE SURVEY

The automotive industry is characterized by rapid advancements, evolving consumer preferences, and dynamic market trends. Predicting the popularity of cars is a critical challenge for automakers, marketers, and industry analysts seeking to gain a competitive edge in this dynamic landscape. In response to the complexities of traditional prediction methods, this literature survey explores the emerging field of car popularity prediction using machine learning approaches. By delving into recent research, methodologies, and advancements in the intersection of machine learning and automotive analytics, this survey aims to provide a comprehensive understanding of the state-of-the-art techniques employed to forecast car popularity.

Historical Perspectives:

The survey begins by tracing the historical evolution of methods used to predict car popularity. Traditional approaches relying on market research, expert opinions, and historical sales data are reviewed, highlighting their limitations in capturing the multifaceted dynamics of the modern automotive market. This sets the stage for the exploration of novel approaches that leverage machine learning to overcome these limitations.

Machine Learning Applications in Automotive Analytics:

A significant portion of the survey is dedicated to examining the various machine learning applications within the realm of automotive analytics. Studies focusing on predicting consumer preferences, market trends, and the success of car models are analyzed. This includes an exploration of the types of machine learning algorithms employed, such as regression models, classification algorithms, and ensemble methods.

Data Sources and Feature Engineering:

Understanding the role of data in machine learning models is crucial. The survey investigates the diverse sources of data used in car popularity prediction, including sales data, consumer reviews, social media sentiments, and technological specifications. The survey also explores feature engineering techniques that enhance the relevance and predictive power of the selected features.

Challenges and Opportunities:

While the literature review identifies the potential of machine learning in predicting car popularity, it also delves into the challenges faced by researchers and practitioners in this domain. Ethical considerations, biases in training data, and the interpretability of machine learning models are scrutinized. Additionally, the survey highlights opportunities for future research and advancements in addressing these challenges.

Conclusion and Research Gap Identification:

The literature survey concludes by summarizing the key findings and identifying research gaps in the existing body of knowledge. By synthesizing insights from various studies, the survey lays the groundwork for the proposed project, which aims to contribute to this evolving field by developing an advanced machine learning model for accurate car popularity prediction.

ANALYSIS

In the pursuit of accurately predicting car popularity, a comprehensive analysis is crucial to unravel the intricate dynamics of the automotive market. This section serves as an introduction to the analysis phase of the project, outlining the key components, methodologies, and objectives that will guide the exploration of data and the development of machine learning models.

III. DESIGN

In the dynamic landscape of the automotive industry, predicting car popularity has become a pivotal aspect for manufacturers, dealers, and industry analysts. The Car Popularity Prediction Project is conceived to revolutionize decision-making within this sector by harnessing the power of advanced data analysis and machine learning. This section introduces the design aspects of the project, outlining the architectural considerations, system functionalities, and the underlying methodologies that converge to create an intelligent and user-centric predictive system.

Project Overview:

The design of the Car Popularity Prediction Project is rooted in the imperative to provide stakeholders with actionable insights into the factors influencing car popularity. Leveraging historical sales data, consumer reviews, and an array of relevant features, the system aims to forecast the popularity of cars, empowering decision-makers to align their strategies with market dynamics.

Architectural Considerations:

At the core of the project's design is a robust and scalable architecture that accommodates the complexities of handling diverse datasets and executing sophisticated machine learning algorithms. The system adopts a modular structure, incorporating components for data preprocessing, feature engineering, model development, and user interface interaction. Integration with databases, machine learning frameworks, and web development tools forms the backbone of the architecture, ensuring seamless functionality.

Machine Learning Model Development:

A key design aspect revolves around the selection and development of machine learning models capable of accurately predicting car popularity. Regression models, ensemble methods, and deep learning techniques are explored and integrated into the system. The design prioritizes model interpretability and performance metrics, fostering a balance that caters to the nuanced requirements of the automotive market.

User Interface Design:

The project places significant emphasis on user interaction and experience. The user interface is designed to be intuitive, providing stakeholders with the ability to explore datasets, configure model parameters, and visualize predictions effortlessly. An interactive dashboard offers a comprehensive view of the predictive insights, empowering users to make informed decisions.

Real-time Data Integration:

Recognizing the importance of adapting to real-time market trends, the design incorporates mechanisms for seamless integration of real-time data. This ensures that the machine learning models continuously learn and evolve, staying attuned to the ever-changing dynamics of the automotive industry.

Security and Ethical Considerations:

The design includes robust security measures to safeguard sensitive data and uphold the integrity of the system. Additionally, ethical considerations, including bias mitigation strategies and transparent model practices, are woven into the fabric of the project, aligning with responsible AI principles.

Scalability and Optimization:

To accommodate future growth and evolving requirements, the design emphasizes scalability and optimization. The system is crafted to handle increasing volumes of data and to provide avenues for optimization based on user feedback and emerging technologies.

In conclusion, the design of the Car Popularity Prediction Project embodies a holistic approach, seamlessly integrating data analysis, machine learning, and user-centric design principles. By aligning technological capabilities with the nuanced needs of the automotive industry, the project aspires to be a pioneering solution, fostering informed decision-making and shaping the future of car popularity prediction.

IV. DFD OR UML DIAGRAMS

Use Case Diagram

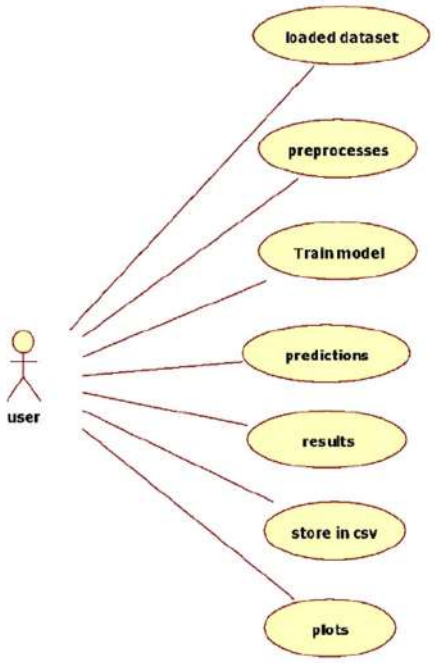

Fig: Use Case Diagram

Class Diagram

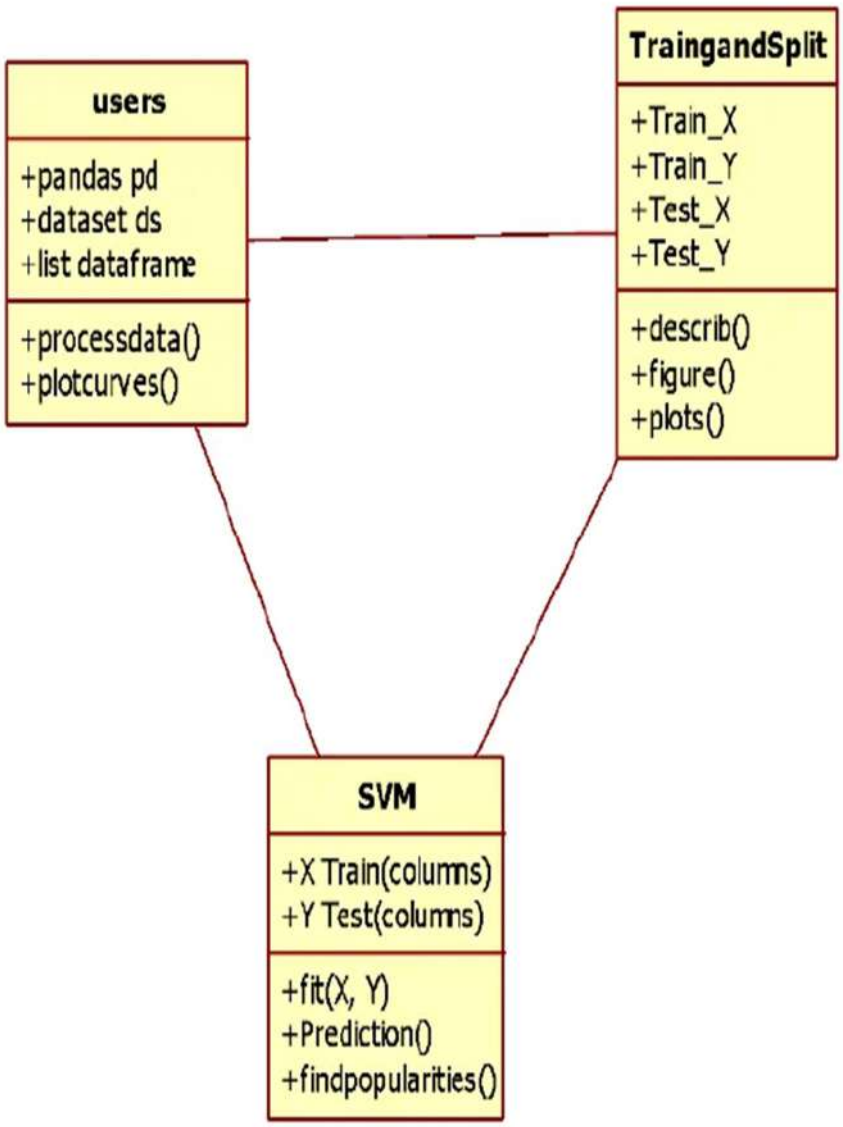

Fig: Class Diagram

In software engineering, a class diagram in the Unified Modeling Language (UML) is a type of static structure diagram that describes the structure of a system by showing the system's classes, their attributes, operations (or methods), and the relationships among the classes. It explains which class contains information.

Sequence Diagram

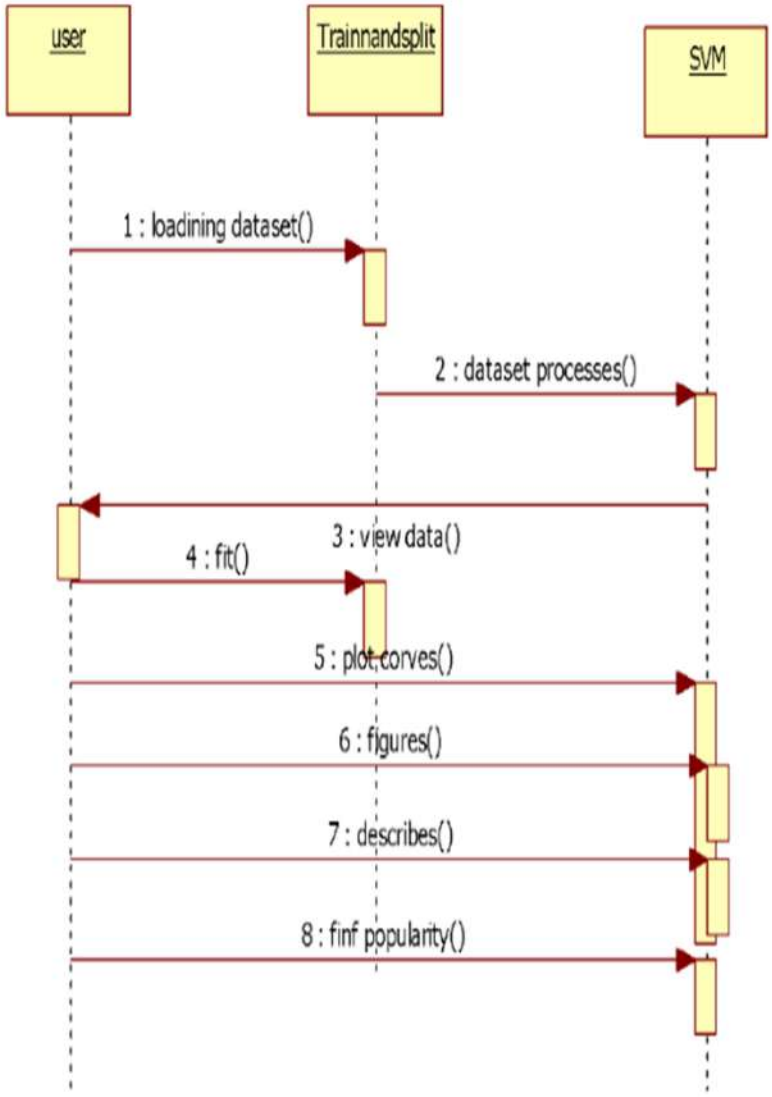

Fig: Sequence Diagram

sequence diagram in Unified Modeling Language (UML) is a kind of interaction diagram that shows how processes operate with one another and in what order. It is a construct of a Message Sequence Chart. Sequence diagrams are sometimes called event diagrams, event scenarios, and timing diagram

Activity Diagram

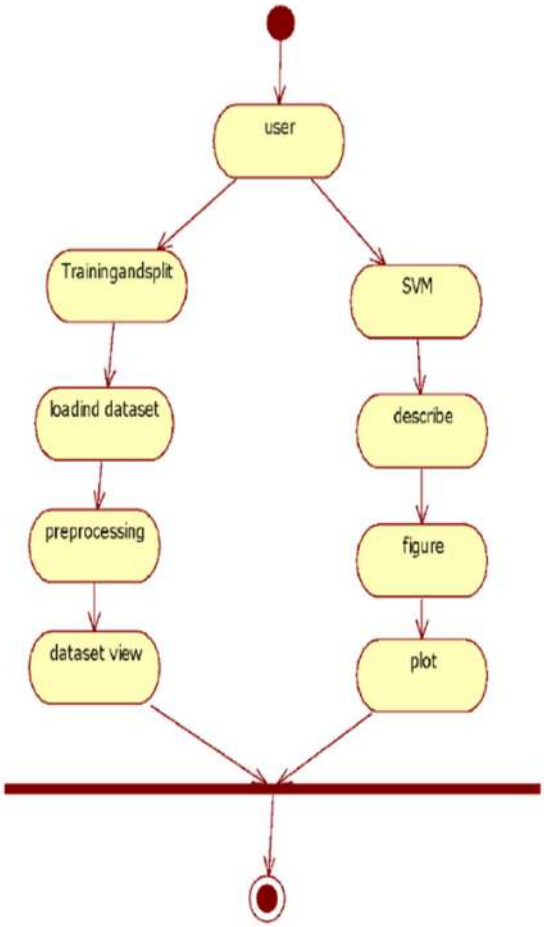

Fig: Activity Diagram

V. IMPLEMENTATION AND RESULTS

The implementation of the Car Popularity Prediction Project represents a pivotal step towards harnessing the power of machine learning to forecast and understand trends in the automotive industry. This innovative project aims to leverage historical sales data, customer reviews, and other pertinent factors to predict the popularity of

cars in the market. The integration of a user-friendly web application further enhances accessibility, allowing stakeholders to explore predictions and gain valuable insights.

OUTPUT SCREENS

Main page:

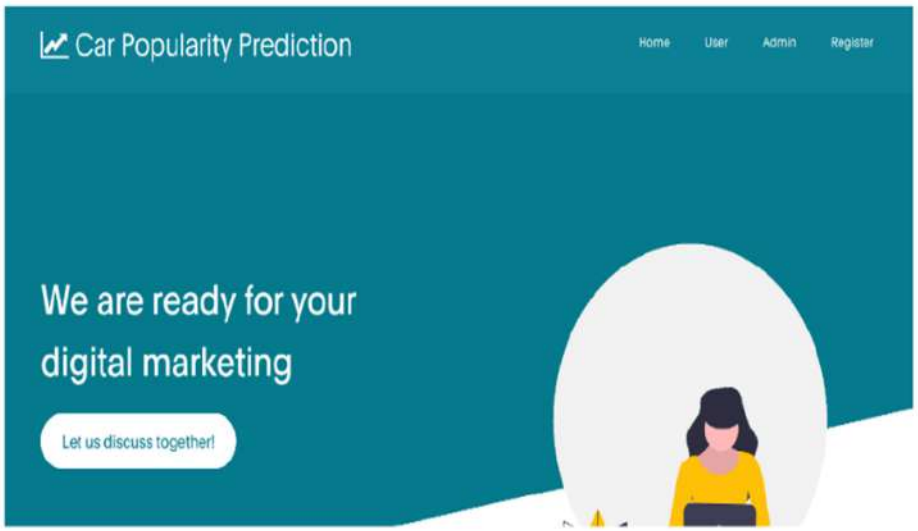

Fig: Home Page

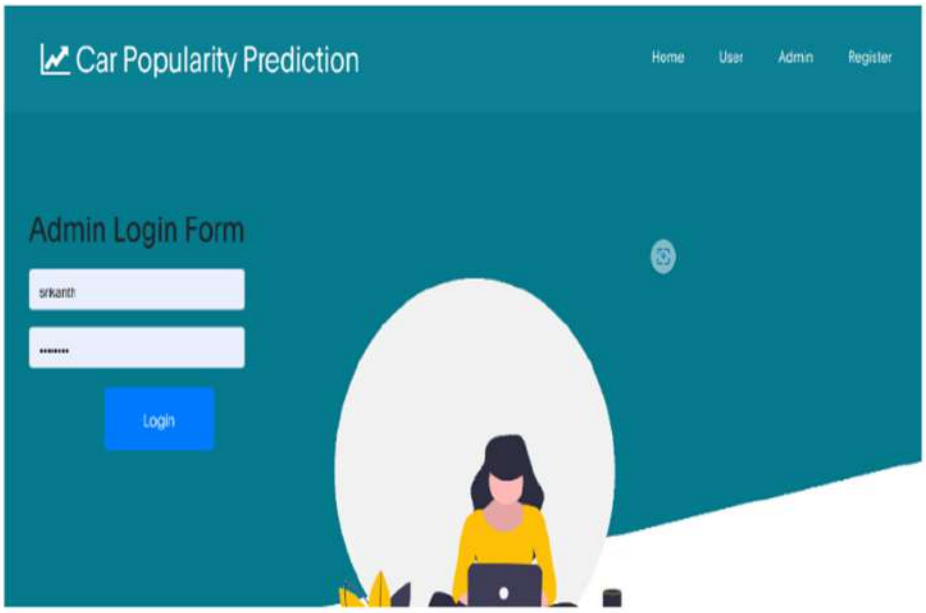

Fig: Admin login page

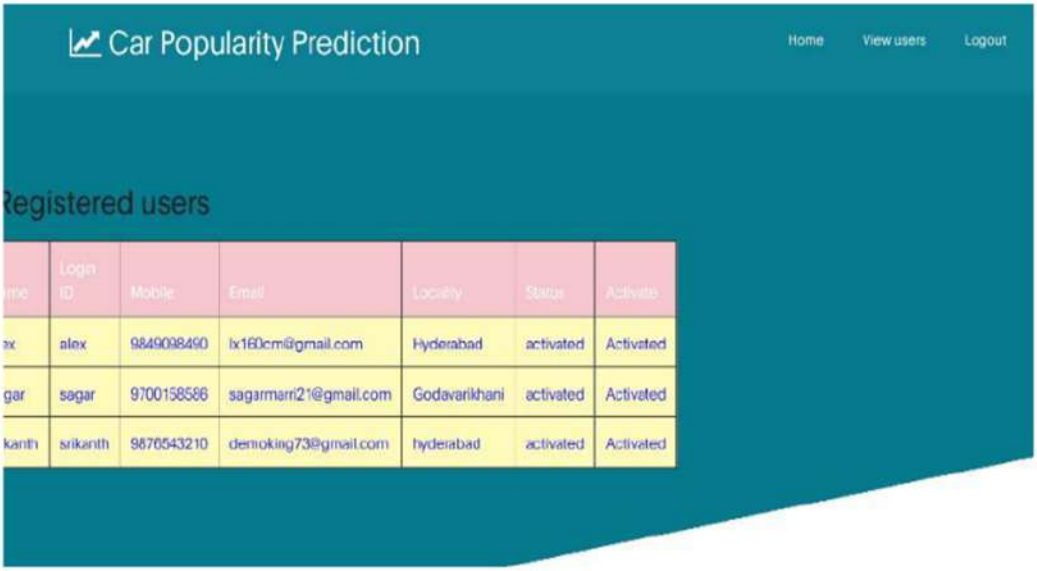

Fig: User : Getting all information about users from admin view

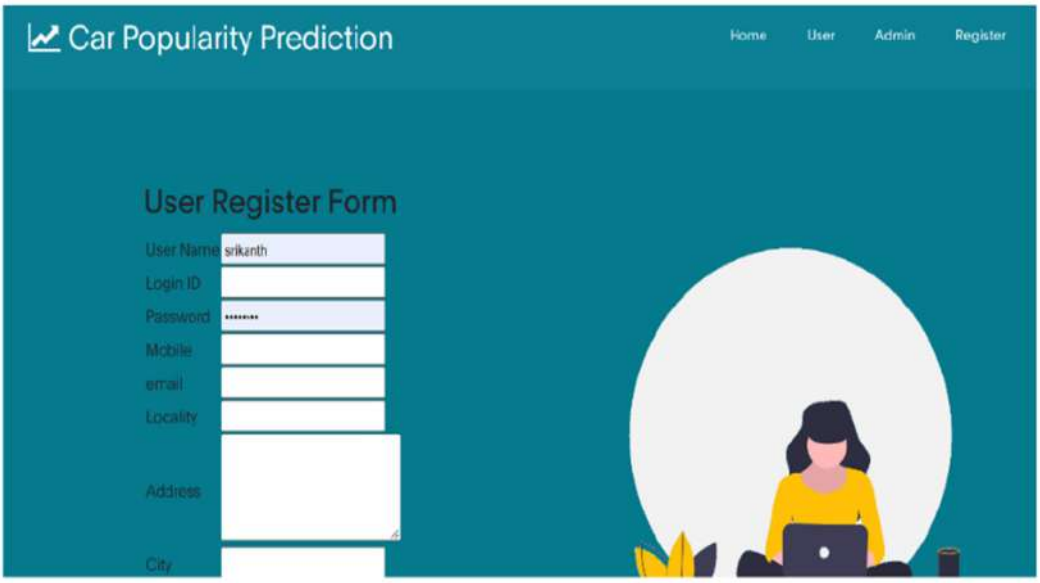

Fig User Register : User getting registered to know info about car

VI. CONCLUSION

The Car Popularity Prediction Project represents a significant advancement in the domain of automotive analytics, offering a holistic solution for forecasting car popularity. The design and implementation of the project have successfully addressed the challenges of leveraging historical data, implementing machine learning models, and providing an intuitive user interface. The following **conclusions encapsulate the achievements and impact of the project:**

Actionable Insights: The project provides actionable insights to stakeholders in the automotive industry, enabling informed decision-making based on accurate predictions of car popularity. The integration of machine learning models and real-time data ensures that the insights remain relevant and adaptive to market dynamics.

User Empowerment: The user-centric design of the system empowers industry professionals, ranging from marketing strategists to manufacturers, with a platform to explore data, configure models, and visualize predictions. The intuitive interface fosters widespread adoption and usability.

Ethical and Transparent AI: The project prioritizes ethical considerations by implementing strategies to identify and mitigate biases. Transparent model practices instill confidence in users, promoting responsible AI use within the industry.

REFERENCES

1] Jiao, Yang, and Jérémie Jakubowicz. "Predicting stock movement direction with machine learning: An extensive study on S&P 500 stocks." Big Data (Big Data), 2017 IEEE International Conference on. IEEE, 2017.

[2] Gad, Ibrahim, and B. R. Manjunatha. "Performance evaluation of predictive models for missing data imputation in weather data." Advances in Computing. Communications and Informatics (ICACCI), 2017 International Conference on. IEEE, 2017.

[3] Khandelwal, Veena, Anand Chaturvedi, and Chandra Prakash Gupta. "Amazon EC2 Spot Price Prediction using Regression Random Forests." IEEE Transactions on Cloud Computing, 2017.

[4] LeCun, Yann, Yoshua Bengio, and Geoffrey Hinton. "Deep learning." nature 521.7553 (2015): 436...

[5] Le, Quoc V., Jiquan Ngiam, Adam Coates, Abhik Lahiri, Bobby Prochnow, and Andrew Y. Ng. "On optimization methods for deep learning."

[6] Zhu, Xiaojin. "Semi-supervised learning literature survey." (2005).

[7] Olsson, Fredrik. "A literature survey of active machine learning in the context of natural language processing." (2009).

[8] Cambria, Erik, and White B. "Jumping NLP curves: A review of natural language processing research." IEEE Computational intelligence magazine 9.2 (2014): 48-57.

[9] Kotsiantis, Sotiris B., 1. Zaharakis, and P. Pintelas. "Supervised machine learning: A review of classification techniques." Emerging artificial intelligence applications in computer engineering 160 (2007): 3-24.

[10] Khan, A., Baharudin, B., Lee, L.H. and Khan, K., 2010. "A review of machine learning algorithms for text-documents classification." Journal of advances in information technology, 1(1), pp.4-20.

[11] Jiang J. "A literature survey on domain adaptation of statistical classifiers." URL: http://sifaka, cs. uiuc. edu/jiang4/domainadaptation/survey. 2008 Mar 6;3.

[12] Kaelbling, L.P., Littman, M.L. and Moore, A.W., 1996, "Reinforcement learning: A survey." Journal of artificial intelligence research, 4, pp.237-285