1. **Summary of the Given Paper**

- **Title**: Hybrid Predictive Modeling for Charging Demand Prediction of Electric Vehicles
- **Paper Name**: (Sustainability_2022_Hybrid Predictive Modeling for Charging Demand Prediction of Electric Vehicles)
- **Authors**: Pablo Castro, Alberto Laso, Raquel Martínez, Young-Eun Jeon, Suk-Bok Kang (Corresponding Author), Jung-In Seo
- **Journal**: Sustainability
- **Publisher**: None
- **Published Year**: 2022
- **Workflow/Process**: The paper outlines a structured approach to predict charging demand using time series analysis, incorporating both traditional and machine learning techniques. It includes data exploration, feature consideration, and model evaluation through various accuracy measures.
- **Methodology**: The study employs time series methods, including dynamic harmonic regression, seasonal and trend decomposition using Loess, and Bayesian structural time series, alongside machine learning techniques like random forest and extreme gradient boosting.
- **Approaches**: A hybrid strategy is proposed to enhance prediction accuracy by combining traditional time series methods with machine learning, addressing the limitations of tree-based methods in capturing trends. Seasonal variations are modeled using Fourier transforms to account for multiple seasonal patterns.
- **Source**: The research is based on the increasing demand for electric vehicles and the need for efficient energy management.
- **Dataset**: The specific dataset used for analysis is not detailed in the provided context.
- **Dataset Availability**: The availability of the dataset is not specified in the provided context.
- **Dataset Source Link**: No link is provided for the dataset source.
- **Research Gaps**: The paper identifies the need for improved prediction methods that can effectively capture trends and seasonal variations in charging demand.
- **Research Key Findings**: The experimental results indicate that the hybrid strategy significantly improves the accuracy of charging demand predictions compared to traditional machine learning methods.

- **Result Output**: The findings suggest that the proposed hybrid strategy is beneficial for planning future power supply and demand and for efficient electricity grid management .

2. **Summary of the Paper**

- **Title**: Machine Learning Based Forecasting of EV Charging Load in a Parking Lot for Optimal Participation in Frequency Services
- **Paper-name**: (journal_2025_Machine Learning Based Forecasting of EV Charging Load in a Parking Lot for Optimal Participation in Frequency Services)
- **Authors**: Julian Marius Mittag, Marius Secchi, Jan Martin Zepter, Anna Martin, Mattia Marinelli
- **Journal**: Not specified
- **Publisher**: None
- **Published-year**: 2025
- **Workflow/Process**: The study involves forecasting EV load and decision-making for market participation, utilizing a rolling horizon optimization model to allocate capacity for frequency services based on historical data and demand forecasts.
- **Methodology**: The methodology includes a forecasting algorithm for EV load and a decision-making market participation algorithm, focusing on optimizing bids in early and late auctions.
- **Approaches**: The approach involves creating artificial parking lots based on a single dataset, analyzing load curves, and considering seasonal variations in demand and pricing for frequency services.
- **Source**: Not specified
- **Dataset**: A dataset from a single parking lot used to create artificial parking lots.
- **Dataset-availability/Public/Open-accessible**: Not specified
- **Dataset-source-link**: Not specified
- **Research-gaps**: Limitations include potential anomalies in the original dataset affecting the artificial parking lots and the assumption of a stable load curve.
- **Research Key Findings**: The profitability of frequency services is likely underestimated due to seasonal demand variations, and aggregation of EVs can enhance service availability despite individual battery limitations.

- **Result-Output**: The results indicate that profitability for a full year is likely higher than calculated, especially considering price increases in spring and summer months, and the potential for intra-day bid corrections improves resource availability .

3. **Summary of the Paper**

- **Title**: Machine Learning-Based Prediction for EV Charging Station Availability and Wait-Time Estimation
- **Paper Name**: (journal_year_Title)
- **Author**: Zhang et al.
- **Journal**: Not specified
- **Publisher**: Not specified
- **Published Year**: 2021
- **Workflow/Process**: The study proposes a machine learning-based prediction model that utilizes real-time data inputs such as station location, charger type, prior usage, traffic conditions, and environmental factors to forecast EV charging station availability and wait times.
- **Methodology**: The research employs Random Forest, Linear Regression, and Long Short-Term Memory (LSTM) models to analyze data and make predictions.
- **Approaches**: The approach focuses on integrating real-time data and predictive modeling to enhance the user experience for EV drivers by providing accurate information on charger availability and expected wait times.
- **Source**: Not specified
- **Dataset**: Not specified
- **Dataset Availability/Public/Open-Accessible**: Not specified
- **Dataset Source Link**: Not specified
- **Research Gaps**: The study highlights the need for real-time data integration and raises questions regarding practical implementation despite advancements over existing methods.
- **Research Key Findings**: The proposed model achieved 87.4% accuracy in forecasting station availability, with average wait times in crowded cities being 7.8 minutes.

- **Result Output**: The findings suggest that the approach can reduce wait times and optimize the use of EV infrastructure, thereby improving the EV user experience and supporting eco-friendly transportation systems .

4. **Summary of the Paper**

- **Title**: Machine Learning Models for Predicting and Managing Electric Vehicle Load in Smart Grids
- **Paper Name**: E3S Web of Conferences_2024_Machine Learning Models for Predicting and Managing Electric Vehicle Load in Smart Grids
- **Authors**: Vasupalli Manoj, M Ramasekhara Reddy, G Nooka Raju, Ramakrishna Raghutu, P A Mohanarao, Aakula Swathi
- **Journal**: E3S Web of Conferences
- **Publisher**: E3S Web of Conferences
- **Published Year**: 2024
- **Workflow/Process**: The research integrates various machine learning models to enhance the accuracy of electric vehicle (EV) load forecasting and management in smart grids, addressing challenges like data reliability and model scalability.
- **Methodology**: The study employs a combination of neural networks, fuzzy logic, and deep learning techniques, including Variational Mode Decomposition (VMD) and Long Short-Term Memory (LSTM) models.
- **Approaches**:
    - Neuro-Fuzzy approach for energy load forecasting.
    - Deep Q-learning for EV scheduling.
    - Genetic Algorithm (GA) and Gated Recurrent Unit (GRU) for optimizing EV charging.
    - Demand Side Management (DSM) algorithms using Bat Optimization Algorithm (BOA) and Slime Mould Algorithm (SMA) for grid stabilization.
- **Source**: E3S Web of Conferences
- **Dataset**: The paper does not specify a particular dataset.
- **Dataset Availability**: Not explicitly mentioned.
- **Dataset Source Link**: Not provided.
- **Research Gaps**: The need for real-time data processing advancements and consumer perception modeling to improve load control strategies.

- **Research Key Findings**: The integration of advanced machine learning models significantly enhances the forecasting accuracy of EV loads, contributing to grid stability and efficiency.
- **Results/Output**: The study indicates that employing sophisticated models can lead to better management of energy resources in the context of increasing EV adoption, ultimately promoting green energy usage and reducing peak loads .

5. **Summary of the Paper**

- **Title**: Predicting Electric Vehicle Demand for Charging Stations: Time Series and Machine Learning Approaches
- **Paper-name**: (journal_year_Predicting Electric Vehicle Demand for Charging Stations: Time Series and Machine Learning Approaches)
- **Authors**: Farnoosh Roozkhosh, Angela Yao
- **Journal**: Not specified
- **Publisher**: Not specified
- **Published-year**: Not specified
- **Workflow/Process**:
    - Assessing accessibility to Tesla and non-Tesla charging stations across seasons.
    - Developing time series and machine learning models incorporating socioeconomic factors and accessibility.
    - Analyzing model performance to forecast EV charging demand.
- **Methodology**:
    - Utilizes time series models (LSTM, VAR) and machine learning algorithms (Random Forest, XGBoost) to predict EV charging demand.
- **Approaches**:
    - Employs predictive models to capture temporal dynamics and uncover relationships between features affecting demand.
    - Evaluates model performance using metrics like Mean Absolute Error and R Squared.
- **Source**: Not specified

- **Dataset**:
    - Comprises temporal EV registration data, charging connector types, and geographic information on charging station locations.
- **Dataset-availability/Public/Open-accessible**: Not specified
- **Dataset-source-link**: Not specified
- **Research-gaps**:
    - Limited studies on the influence of EV charging station accessibility on demand prediction.
- **Research Key Findings**:
    - Seasonal variations in EV charging demand are influenced by accessibility to charging infrastructure and socioeconomic factors at the county level.
- **Results/Output**:
    - Enhanced precision and reliability of demand predictions for EV charging stations using the proposed models.

6. **Summary of the Paper**

- **Title**: Prediction of Electric Vehicles Charging Load Using Long Short-Term Memory Model
- **Paper Name**: (journal_year_Prediction of Electric Vehicles Charging Load Using Long Short-Term Memory Model)
- **Authors**: Eugenia Cadete, Caiwen Ding, Mimi Xie, Sara Ahmed, Yu-Fang Jin
- **Journal**: Not specified
- **Publisher**: Not specified
- **Published Year**: Not specified
- **Workflow/Process**: The study involved collecting hourly energy consumption data from three EV charging stations over two years, followed by applying various modeling methods to predict charging loads.
- **Methodology**: The research utilized Long Short-Term Memory (LSTM) models and Autoregressive Integrated Moving Average (ARIMA) models for prediction.
- **Approaches**: Three modeling methods were applied: multi-step LSTM, one-step LSTM, and ARIMA, focusing on their performance in predicting energy consumption.

- **Source**: University of Texas at San Antonio
- **Dataset**: Hourly energy consumption data from 3 EV charging stations
- **Dataset Availability**: Not specified
- **Dataset Source Link**: Not specified
- **Research Gaps**: Limited research on predicting energy consumption of EV charging stations due to complexity.
- **Research Key Findings**: LSTM models significantly outperformed ARIMA models in prediction accuracy, indicating their effectiveness for temporal predictions in EV charging data.
- **Paper's Original Results/Output**:
    - 1-step LSTM model showed smaller MAE and RMSE compared to 5-step and 15-step models.
    - ARIMA model had $R^2 = 0.18$, while LSTM models had R^2 close to 1, demonstrating superior performance in predictions .

7. **Summary of the Paper**

- **Title**: Prediction of Electric Vehicle Charging Using Machine Learning
- **Paper Name**: (SSRN_2023_Prediction of Electric Vehicle Charging Using Machine Learning)
- **Authors**: Veerpal Kaur, Divya Sharma, Shubham Kumar Dwivedi, Manish Kumar Yadav, Ankit Kumar, L Singh, Priyanshu Sharma
- **Journal**: Not specified
- **Publisher**: Not specified
- **Published Year**: Not specified
- **Workflow/Process**: The study employs machine learning techniques to predict EV charging patterns and demands, utilizing historical data and relevant variables to enhance charging infrastructure efficiency.
- **Methodology**: The research utilizes various machine learning algorithms, including random forests and linear regression, to analyze real-world EV charging data.

- **Approaches**: The study focuses on optimizing the use of fast-charging stations through predictive modeling, assessing the performance of different algorithms in terms of accuracy and error rates.
- **Source**: https://ssrn.com/abstract=4495876
- **Dataset**: EV charging data collected from various sources, including charging stations and mobile applications.
- **Dataset Availability**: Open-accessible
- **Dataset Source Link**: Not specified
- **Research Gaps**: The paper identifies the need for improved prediction accuracy and better resource management in EV charging infrastructure.
- **Research Key Findings**: Machine learning algorithms can effectively predict EV charging demands, with random forests outperforming decision trees in accuracy.
- **Paper's Original Results/Output**: The neural network model achieved an error rate of less than 5% in predicting charging demand, indicating high accuracy in the predictions made .

8. **Summary of the Paper**

- **Title**: Research on electric vehicle charging load prediction method based on spectral clustering and deep learning network
- **Paper Name**: (Frontiers in Energy Research_2024_Research on electric vehicle charging load prediction method based on spectral clustering and deep learning network)
- **Authors**: Fang Xin, Xie Yang, Wang Beibei (Corresponding Author), Xu Ruilin, Mei Fei, Zheng Jianyong, Mohd Hasan, Yan Qin, Balakumar Muniandi
- **Journal**: Frontiers in Energy Research
- **Publisher**: None
- **Published Year**: 2024
- **Workflow/Process**:
    - Use Monte Carlo simulation to sample historical EV charging load data.
    - Apply spectral clustering to categorize the data into clusters based on similar characteristics.

    - Construct and train CNN-LSTM models for each cluster to predict charging loads.
- **Methodology**: The study employs a hybrid approach combining Monte Carlo simulation, spectral clustering, and deep learning (CNN-LSTM) to enhance prediction accuracy of EV charging loads.
- **Approaches**:
    - **Monte Carlo Simulation**: Addresses data insufficiency by generating additional samples from historical data.
    - **Spectral Clustering**: Identifies patterns in the data by grouping similar charging load characteristics.
    - **CNN-LSTM Models**: Utilizes deep learning to capture complex relationships in the clustered data for accurate predictions.
- **Source**: Frontiers in Energy Research, DOI: 10.3389/fenrg.2024.1294453
- **Dataset**: Historical EV charging load data.
- **Dataset Availability**: Open-accessible.
- **Dataset Source Link**: Not provided in the context.
- **Research Gaps**: The paper addresses challenges in EV charging load prediction, including data reliability, variability in charging behavior, and lack of standardization methods.
- **Research Key Findings**: The proposed method significantly improves prediction accuracy compared to traditional methods that do not utilize clustering.
- **Paper's Original Results/Output**: The results indicate that the integration of Monte Carlo simulation and clustering enhances model fitting and generalization abilities, leading to better prediction performance for EV charging loads .

9. **Summary of the Paper**

- **Title**: Short-Term Load Forecasting for Electric Vehicle Charging Stations Based on Deep Learning Approaches
- **Paper Name**: Appl. Sci. 2019, 9, x FOR PEER REVIEW

- **Authors**: Juncheng Zhu, Zhile Yang, Yuanjun Guo, Jiankang Zhang, Huikun Yang
- **Journal**: Applied Sciences
- **Publisher**: None
- **Published Year**: 2019
- **Workflow/Process**: The paper discusses the forecasting of electric vehicle (EV) charging loads, emphasizing the need for accurate models due to the stochastic nature of EV charging behaviors. It employs deep learning techniques to enhance forecasting accuracy.
- **Methodology**: The study utilizes four featured deep learning approaches to model and predict EV charging loads from the perspective of charging stations.
- **Approaches**: The approaches compared include Long-Short Term Memory (LSTM) and Gated Recurrent Units (GRU), among others, focusing on their performance in forecasting scenarios.
- **Source**: The research is based on historical data related to EV charging.
- **Dataset**: The dataset consists of hourly-based historical data on EV charging scenarios.
- **Dataset Availability**: The dataset is not explicitly stated as public or open-accessible in the provided context.
- **Dataset Source Link**: Not provided in the context.
- **Research Gaps**: The paper identifies the need for improved forecasting models to address the challenges posed by the mass rollout of EVs on power systems.
- **Research Key Findings**: The GRU model demonstrated the best performance in terms of accuracy for hourly-based short-term EV load forecasting.
- **Paper's Original Results/Output**: Numerical results indicate that the GRU model provides a useful tool for higher accuracy in forecasting EV charging loads .

10.Title: Bayesian Deep Learning for EV Charging Station Forecasting

Paper Name: (Journal_2025_Bayesian Deep Learning for EV Charging Station Forecasting)
Authors: Not provided
Journal: Not specified

Publisher: Not specified
Published Year: 2025
Workflow/Process: Integrated Bayesian deep learning with LSTM for forecasting charging station load.
Methodology: Two-stage framework with data preprocessing and forecasting using Bayesian probability theory.
Approaches: Variational inference to handle uncertainties in load predictions.
Source: [Link not provided]
Dataset: Operational data from Caltech's EV charging station.
Dataset Availability: Not specified
Dataset Source Link: Not applicable
Research Gaps: Continued optimization of the BDL model.
Research Key Findings: LSTM-BDL model outperformed benchmarks significantly.
Original Results/Output: Achieved 39.3% lower RMSE and 42.4% lower MAE versus support vector regression.