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Thème

**Time Series and Deep Learning for Rainfall Forecasting
Using Weather Data in Algeria**

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DEDICATION

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With the increasing impact of global warming and the diverse climatic conditions prevalent in Algeria, the irregularity of rainfall patterns has become a significant concern, and rainfall forecasting has become very challenging.

Our work aims to investigate the effectiveness of using weather for rainfall forecasting in Algeria using Deep Learning. The research objectives encompass identifying relevant weather data specific to Algeria, employing various Time Series and Deep learning algorithms and techniques to determine the most accurate approach for utilizing Algerian climatic indices as input features, and evaluating the effectiveness of incorporating this data in rainfall prediction models.

By addressing these objectives, this study contributes to a better understanding of how weather data can improve rainfall forecasting in Algeria's context.

Keywords: Time Series, deep learning, rainfall forecasting, climatic changes, climatic analysis, artificial intelligence, weather data

Avec l'impact croissant du réchauffement climatique et les diverses conditions climatiques prévalant en Algérie, l'irrégularité des régimes de précipitations est devenue une préoccupation importante, et les prévisions de précipitations sont devenues très difficiles..

Notre travail vise à étudier l'efficacité de l'utilisation de la météo pour la prévision des précipitations en Algérie en utilisant le Deep Learning. Les objectifs de recherche englobent l'identification des données météorologiques pertinentes propres à l'Algérie, en utilisant divers algorithmes et techniques de séries chronologiques et d'apprentissage profond pour déterminer l'approche la plus précise pour utiliser les indices climatiques algériens comme caractéristiques d'entrée, et évaluer l'efficacité de l'intégration de ces données dans les modèles de prévision des précipitations.

En abordant ces objectifs, cette étude contribue à une meilleure compréhension de la façon dont les données météorologiques peuvent améliorer les prévisions de précipitations dans le contexte algérien.

Mots-clés : Time Series, apprentissage profond, prévision des précipitations, changements climatiques, analyse climatique, intelligence artificielle, données météorologiques

ABBREVIATIONS

- AI:** Artificial Intelligence.
- ML:** Machine Learning.
- DL:** Deep Learning.
- KNN:** K Nearest Neighbors.
- ANN:** Artificial Neural Networks.
- RF:** Random Forest.
- RMSE:** Root Mean Squared Error.
- MAE:** Mean Absolute Error.
- MBE:** Mean Bias Error.
- ELM:** Extreme Learning Machine.
- R²:** R-squared.
- ReLU:** The Rectified Linear Unit.
- LSTM:** Long Short-Term Memory.
- SVM:** Support Vector Machines.
- SVR:** Support Vector Regression.
- NLP:** Natural Language Processing.
- IoT:** Internet of Things.
- NN:** Neural Networks.
- CNN:** Convolutional Neural Networks.

MASE: Mean Absolute Squared Error.

MAPE: Mean Absolute Percentage Error.

BP: Back Propagation.

SOM: Self Organizing Map.

GR: Generalized Regression.

RBF: Radial Basis Function.