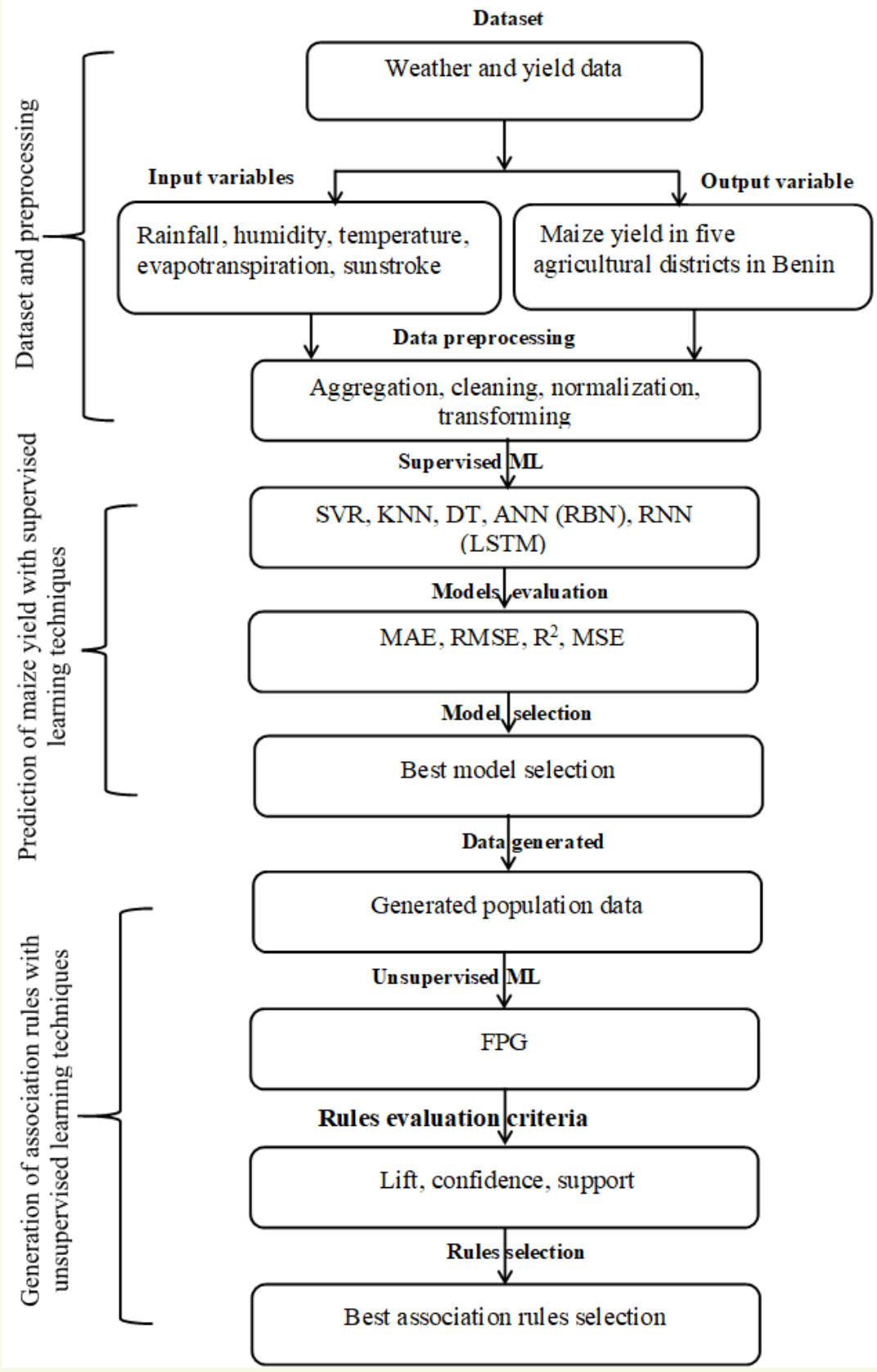
An approach to get the best parameters for high yields: case of maize yield in Benin Republic

The research question

What are the best weather parameter associations to optimize maize yield in Benin?

How do we address the research question?

Flowchart showing the overview of the main inputs and the methodology used.



What we found

Maize yield modeling

Table presents the performance of the supervised ML models using different evaluation metrics.

Models	RMSE	MAE	R2	MSE
KNN	0.132	0.098	0.755	**0.017**
SVM	0.145	0.110	0.704	0.021
ANN	0.16	0.125	0.618	0.028
RNN	0.156	0.116	0.656	0.023
DT	**0.012**	**0.0008**	**0.998**	0.021

Association rules

Maize yields are higher in the Sudano-Guinean zone when :

- Tmin middle, RR middle, ETP middle;
- ETP middle, RR middle, Umax middle, Sun middle;
- Tmin middle, Umax middle, Tmax middle;
- RR middle, Umax middle, Tmax middle.

In the Sudanian zone, maize yields are higher for:

- Tmin middle, ETP middle, Sun middle, Tmax middle;
- Tmin middle, ETP middle, Sun middle, Tmax middle;
- Tmin middle, RR middle, Tmax middle;
- Tmin middle, RR middle, ETP middle, Sun middle

Conclusion

- To optimize maize yield in Benin, we have determined the associations between climatic parameters and maize yield.
- These associations were established using the FPG algorithm.

Bibliography

J. Han, Z. Zhang, J. Cao, Y. Luo, L. Zhang, Z. Li, and J. Zhang. edition of winter wheat yield based on multi-source data and machine learning in China.
M. Shahhosseini, G. Hu, S. Khaki, S. V. Archontoulis, Corn Yield Prediction With Ensemble CNN-DNN, Frontiers in Plant Science 12 (2021). arXiv:2105.14351, doi:10.3389/fpls.2021.709008.

G. P. Souand Tahi[1], Castro G. Hounmènou[1] V. Ratheil Houndji [2,1] & L. Romain Glèlè Kakaï[1],
souandtahi@gmail.com
Laboratoire de Biomathématiques et Estimations Forestières