

Smart Agriculture in Mauritania: Integrating AI-Driven Yield Prediction with Simulated IoT-Based Climate Monitoring

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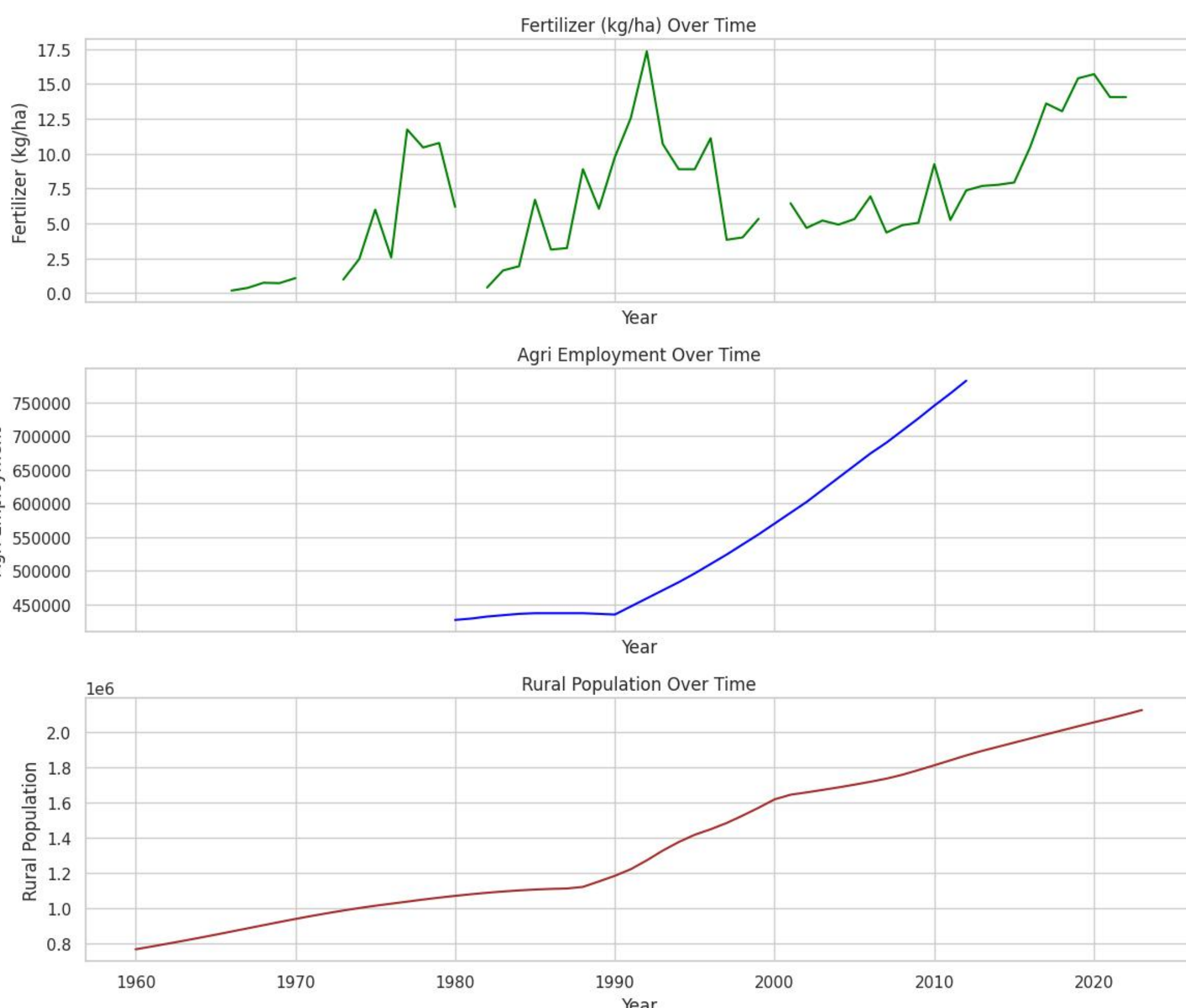
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INTRODUCTION & AIM

- Mauritania's rice sector faces climate variability, market inefficiencies, and low technology adoption.
- Objective: develop a smart agriculture framework combining AI, Big Data, and simulated IoT to forecast rice yield and monitor farm climate.
- The system supports data-driven decision-making for smallholders under climate uncertainty.

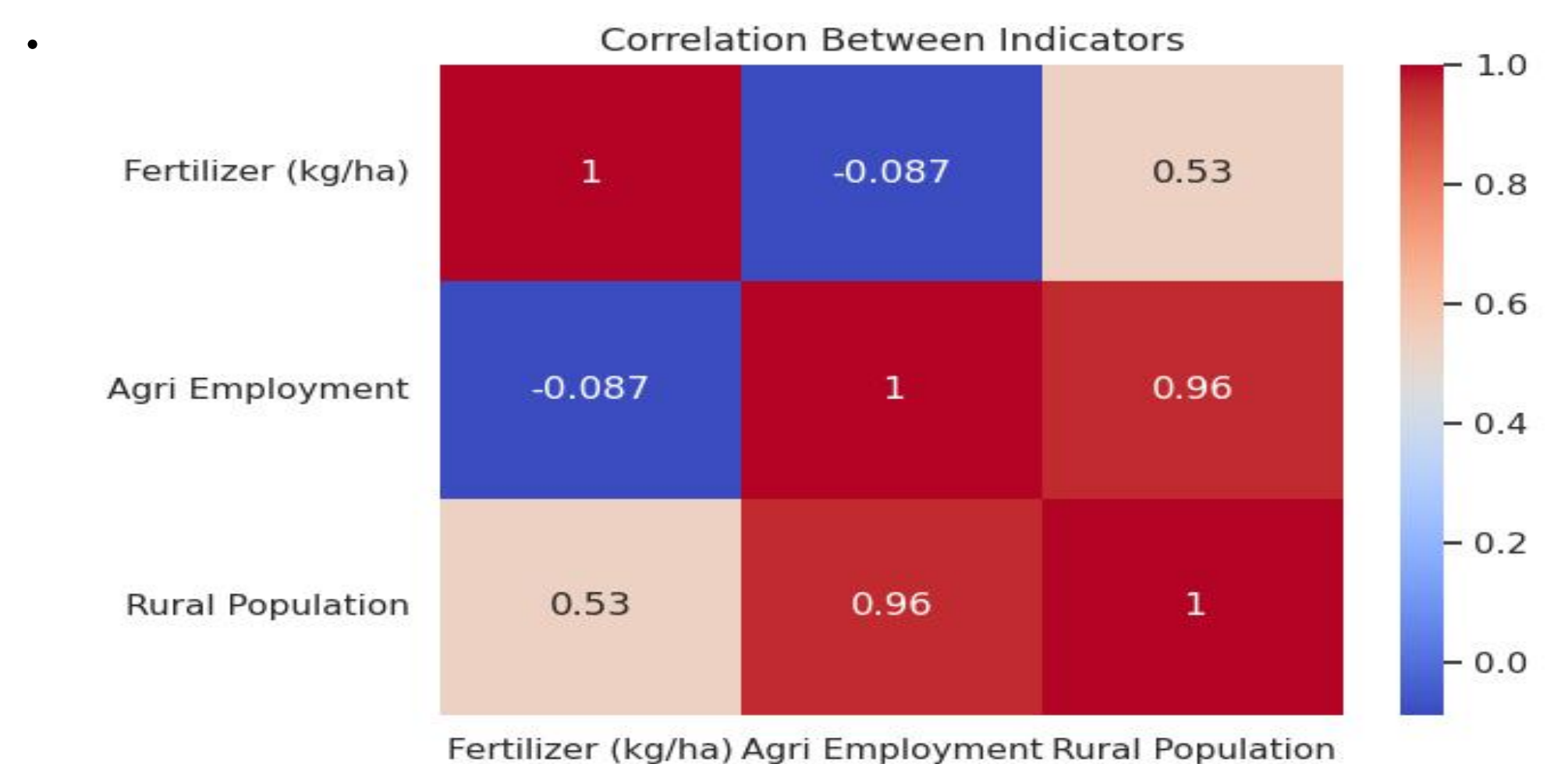
METHOD

- ❖ Historical datasets (1960–2023): Rice yield, fertilizer use, agricultural value added, employment, trade, and prices.
- ❖ Simulated IoT data: generated from historical temperature and humidity to emulate in-field sensors.
- ❖ Predictive models benchmarked:
 - Random Forest ($R^2 = 0.87$)
 - XGBoost
 - LSTM
- ❖ Framework integrates real-time analytics, visualization dashboards, and scalable data storage for future SaaS deployment.



RESULTS & DISCUSSION

- ✓ Random Forest delivered the best accuracy ($R^2 = 0.87$).
- ✓ Key predictors: temperature, rainfall, fertilizer use.
- ✓ Weak price correlation (0.08) shows poor market integration, impacting yield planning.
- ✓ Simulated IoT validated the potential of low-cost digital twins for data-scarce regions.
- ✓ Integrated approach may increase yield by 10–15% under variable climate conditions



CONCLUSION

- ❑ The framework demonstrates how AI and simulated IoT can jointly enable precision rice farming in Mauritania.
- ❑ Combines predictive analytics and climate monitoring to support sustainable production and resource optimization.
- ❑ Provides a foundation for a national smart farming strategy aligned with climate-smart agriculture goals.

FUTURE WORK / REFERENCES

- Deploy real IoT sensors for continuous field validation.
- Extend the framework to other staple crops (e.g., date palm, millet).
- Develop a SaaS platform offering real-time alerts, yield forecasts, and mobile dashboards.