From Surveillance to Predictive Tuberculosis Spatial Clustering

Background

Tuberculosis (TB) remains a critical public health threat in Uganda. Achieving the End TB targets 90% fewer deaths and 80% lower incidence by 2030 requires a shift from traditional surveillance to predictive, data-driven health intelligence. Machine Learning (ML) enables transformation of raw health data into real-time, actionable insights for smarter interventions.

Methods

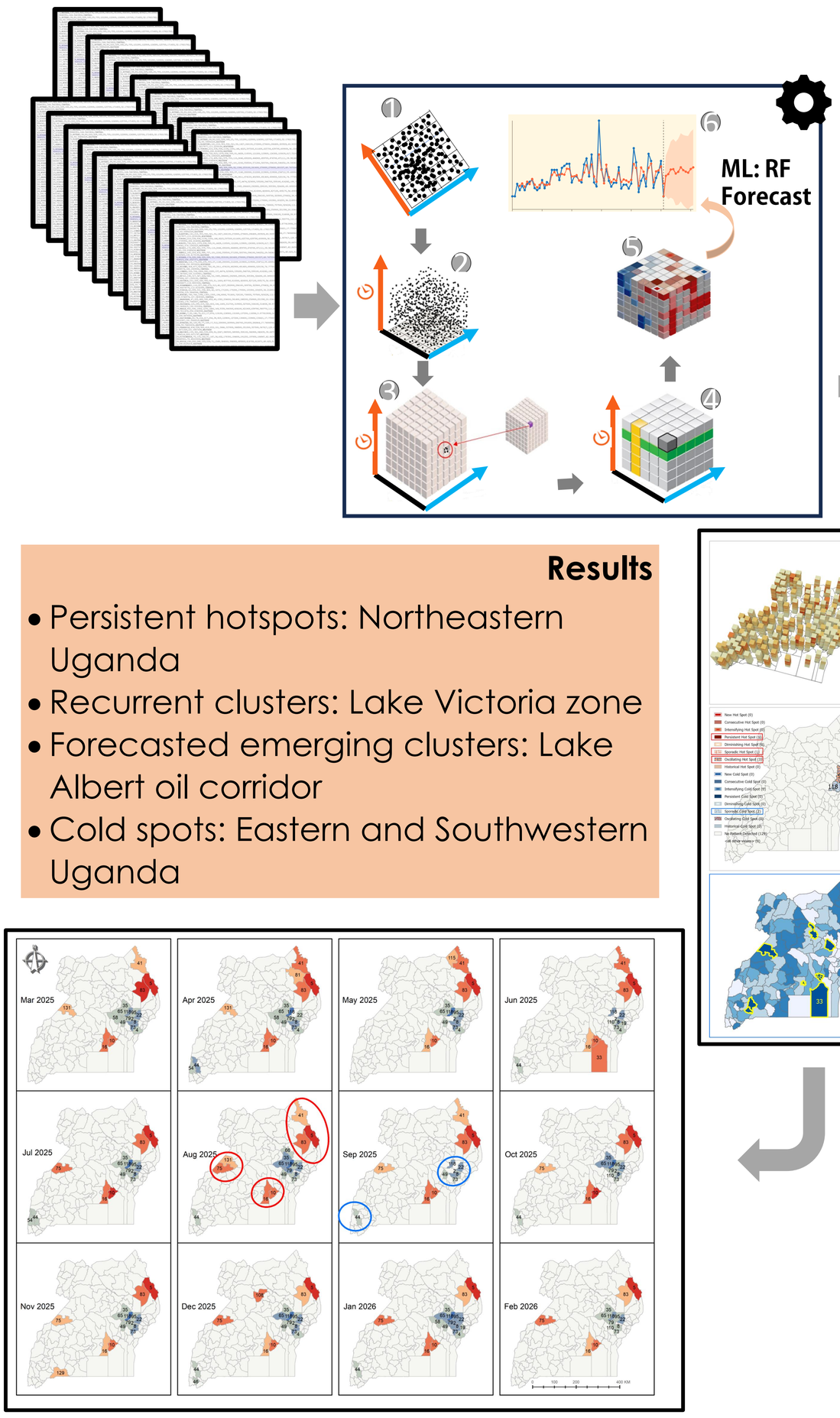
District-level TB case notifications (Jan 2020–Feb 2025) from the National Tuberculosis and Leprosy Programme were analysed using:

- Temporal trend modelling
- Spatial autocorrelation
- Hotspot detection
- Emerging hotspot analysis
- Forest-based space-time predictive analytics

All models used interpretable ML approaches to ensure explainability and integration into health decision-making.

Conclusion

AI and ML integration transforms TB surveillance from retrospective mapping to predictive, actionable intelligence, empowering policymakers with early-warning systems, guides targeted interventions, and strengthens Uganda's pathway toward the End TB 2030 goals.



Results

- Persistent hotspots: Northeastern Uganda
- Recurrent clusters: Lake Victoria zone
- Forecasted emerging clusters: Lake Albert oil corridor
- Cold spots: Eastern and Southwestern Uganda

Credits

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