Research Proposal

Title:

Explainable AI for Predicting Institutional Ranking Movements in India's NIRF Framework: Insights into the Key Drivers of Performance

Abstract:

The National Institutional Ranking Framework (NIRF) serves as India's official performance evaluation system for higher education institutions. However, while institutions invest heavily to improve their standings, limited understanding exists on which parameters drive meaningful improvements. This research applies Explainable Artificial Intelligence (XAI) to NIRF data (2016–2025) to predict institutional ranking movements and uncover the most influential factors affecting performance. Using supervised learning models (e.g., Gradient Boosting, Random Forest) combined with SHAP and LIME interpretability methods, the study aims to create a transparent, data-driven framework to guide policy and institutional strategy. The outcomes will provide predictive insights and actionable recommendations for evidence-based decision-making in higher education management.

Objectives:

- To build predictive AI models capable of forecasting whether an institution's NIRF rank will improve, remain stable, or decline.
- To identify key drivers influencing ranking performance across parameters such as Teaching–Learning & Resources (TLR), Research & Professional Practices (RP), Graduation Outcomes (GO), Outreach & Inclusivity (OI), and Perception.
- To employ explainable AI techniques to interpret the influence of each parameter and institutional characteristic (region, type, size).
- To develop a strategic improvement framework enabling institutions to prioritize impactful areas for sustainable performance enhancement.

Methodology:

1. Data Collection: Compile NIRF data (2016–2025) for all listed institutions, including parameter scores and metadata (state, ownership, category).
2. Data Preparation: Clean and standardize datasets, align institutional names across years, handle missing values, and normalize scores.
3. Feature Engineering: Create derived variables (e.g., year-on-year parameter growth, research intensity ratios, institutional size indicators).
4. Model Development: Train predictive models (Random Forest, Gradient Boosting, Logistic Regression) to classify institutions by ranking movement using temporal validation (train on 2016–2023, test on 2024–2025).
5. Explainable AI Application: Implement SHAP and LIME to interpret model outputs and visualize feature impacts on ranking predictions.

6. Interpretation and Recommendations: Translate AI insights into policy-relevant guidelines for institutional improvement strategies.

Expected Outcomes:

- A validated AI model capable of accurately predicting future NIRF rank changes.
- Identification of the most influential and actionable performance drivers.
- Development of a transparent decision-support framework for higher education management.
- Policy recommendations promoting equitable, data-driven institutional development.

Keywords:

NIRF, Explainable AI, Machine Learning, Higher Education, Ranking Prediction, Institutional Performance, SHAP, LIME.