Individual Project Proposal for INTELLIGENT SYSTEMS

TITLE: Performance vs. Transparency: Fuzzy Systems Against Neural Networks for Customer Churn Prediction

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Motivation:
While neural networks offer high accuracy for churn prediction, their "black box" nature limits their strategic utility. Businesses need to understand why customers leave, not just who. This project compares a transparent Fuzzy Inference System (FIS) with a neural network to evaluate the trade-off between predictive performance and actionable, interpretable insights.

Objectives:
The project is structured around four main objectives:

1. **Data Preprocessing:** To perform comprehensive preprocessing of the Telco Customer Churn dataset, including the encoding of categorical features and the scaling of numerical values, to establish a consistent foundation for both models.
2. **Design of a Fuzzy Inference System (FIS):** To develop a Mamdani-type FIS for classifying churn risk. This involves defining relevant linguistic variables (e.g., "short," "medium," "long" tenure) and creating an interpretable rule base derived from domain logic and data patterns.
3. **Development of a Neural Network:** To develop and train a Multi-Layer Perceptron (MLP) to serve as a high-performance, non-interpretable benchmark. The architecture will be kept simple to maintain focus on the conceptual comparison.
4. **Comparative Evaluation:** To conduct a rigorous comparative analysis of both models. The evaluation will include:
    - **Quantitative Metrics:** Comparing predictive performance using standard metrics such as Accuracy, F1-Score, and AUC.
    - **Qualitative Analysis:** A detailed interpretation of the fuzzy rules extracted from the FIS and a discussion of their practical business value in contrast to the "black box" nature of the MLP.

Dataset:
The project will utilize the "Telco Customer Churn" dataset from Kaggle. It contains data on approximately 7,000 customers, with 21 features describing their subscribed services and final churn status.

Additional Remarks:
The primary focus is to demonstrate how the interpretability of an intelligent system can provide actionable business intelligence that outweighs the benefits of a marginally more accurate but opaque model.

Is this topic a continuation of your group project?:
No