**Project Proposal: Analyzing Donor Behavior Using Deep Learning**

Project 4

Predicting Donor Behavior

Project Proposal

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**1. Introduction**

The purpose of this project is to analyze and predict donor behavior using machine learning techniques, specifically deep learning. By understanding patterns in donor activity, we aim to help nonprofit organizations optimize their fundraising strategies and improve donor engagement. The focus will be on identifying key factors that influence donor retention, donation frequency, and donation amounts.

**2. Data and Field of Interest**

* **Field**: Nonprofit and Charity Organizations – higher education
* **Data**: The project will utilize a dataset containing donor information, donation history, demographic data, and engagement metrics. The data may include variables such as donation amounts, donation frequency, donor age, location, and communication history.
* **Potential Data Sources**:
  + Kaggle datasets related to donor behavior and charity donations
  + Publicly available datasets from nonprofit organizations or research institutions
  + Data provided by a partnering nonprofit organization

**3. Research Questions**

The project will focus on the following key questions:

* What are the main factors that influence donor retention?
* Can we predict which donors are likely to make repeated donations?
* How can we segment donors based on their behavior and preferences?
* What patterns exist in donation amounts over time?
* How can we identify potential major donors from the existing donor base?

**4. Methodology**

* **Data Preprocessing**: Clean the dataset by handling missing values, encoding categorical variables, and normalizing numerical features.
* **Exploratory Data Analysis (EDA)**: Perform EDA to identify trends, correlations, and outliers in the data. Visualizations will be used to illustrate key findings.
* **Model Development**: Implement a deep learning model using TensorFlow/Keras to predict donor behavior. The model may include:
  + **Input Layer**: All relevant features
  + **Hidden Layers**: Multiple layers with ReLU activation functions
  + **Output Layer**: A sigmoid or softmax layer for binary/multiclass classification
* **Model Evaluation**: Evaluate the model using accuracy, precision, recall, F1 score, and AUC-ROC. Cross-validation and hyperparameter tuning will be conducted to optimize performance.
* **Donor Segmentation**: Use clustering techniques (e.g., K-means) to segment donors based on their behavior and model predictions.

**5. Expected Outcomes**

* A predictive model that identifies donors likely to make repeat donations.
* Insights into key factors influencing donor retention and donation amounts.
* Segmentation of donors into different categories based on behavior, which can be used for targeted marketing and engagement strategies.
* Recommendations for nonprofit organizations on how to improve donor retention and increase donations.

**6. Project Timeline**

* **Days 1**: Project determination, data collection
* **Day 2**: Exploratory Data Analysis/Model Development and Training
* **Day 3**: Model Evaluation and Optimization
* **Day 4**: Final Analysis/Report Writing
* **Day 5**: Presentation

**7. Potential Challenges**

* Availability of high-quality, relevant data.
* Complexity in model training due to imbalanced classes (e.g., more one-time donors than repeat donors).
* Interpreting deep learning models for actionable insights.

**8. Conclusion**

This project aims to provide actionable insights to nonprofit organizations by leveraging deep learning techniques to analyze donor behavior. The findings from this study will help organizations better understand their donor base, optimize fundraising efforts, and ultimately increase donor retention and donation amounts.