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## Work Breakdown Structure (WBS) for Graduation Year Prediction

### Project Overview

The Graduation Year Prediction project aims to develop a machine learning model that accurately predicts when students will graduate based on their academic records and other relevant features. This project will utilize Jupyter Notebook with Python and libraries such as Pandas, NumPy, and Scikit-learn.

### Work Breakdown Structure

#### 1. Project Initiation

- Define project scope and objectives
- Identify stakeholders
- Develop project charter

#### 2. Data Collection

- Identify data sources
  - Academic records (grades, course completion)
  - Student demographics (age, major, etc.)
  - Historical graduation data
- Data scraping and cleaning
  - Use Pandas for data manipulation
  - Handle missing values and outliers

#### 3. Data Exploration and Analysis

- Perform exploratory data analysis (EDA)
  - Visualize distributions of graduation years
  - Analyze correlations between features and graduation outcomes
- Feature engineering
  - Create new features based on existing data (e.g., GPA trends, course load)

#### 4. Model Development

- Select machine learning algorithms (e.g., Linear Regression, Decision Trees)
- Split dataset into training and testing sets
- Train the model using historical data

- Validate model performance using metrics (e.g., Mean Absolute Error, R-squared)

#### 5. **Model Evaluation**

- Evaluate model performance on the test set
- Compare results with baseline models
- Fine-tune model parameters for improved accuracy

#### 6. **Deployment**

- Prepare the model for deployment
- Integrate with the application interface (if applicable)
- Ensure the model can handle real-time data input

#### 7. **Testing and Validation**

- Conduct unit testing for individual components
- Perform integration testing for the entire system
- Gather user feedback and make necessary adjustments

#### 8. **Documentation and Reporting**

- Document the entire process and findings
- Prepare a final report summarizing results and recommendations
- Present findings to stakeholders

#### 9. **Project Closure**

- Review project outcomes against objectives
- Gather feedback from stakeholders
- Archive project documentation

#### Tools and Technologies

- **Programming Language:** Python
- **Development Environment:** Jupyter Notebook
- **Libraries:** Pandas, NumPy, Scikit-learn

This WBS provides a detailed breakdown of the tasks required to successfully execute the Graduation Year Prediction project, ensuring all necessary components are addressed.