**Project Proposal:** **Consumer Electronics Sales Data Analysis and Prediction**

**Introduction:** In the rapidly evolving consumer electronics market, understanding customer purchasing behavior is crucial for businesses to optimize their product offerings and marketing strategies. This project aims to analyze sales data from a consumer electronics dataset to identify key trends and predict future purchasing patterns.

**Objective:** The primary objective of this project is to build predictive models that can predict the product category and brand a customer is likely to purchase. This will help businesses in inventory management, targeted marketing, and enhancing customer satisfaction.

**Methodology:**

1. **Data Collection:**
   * Load and inspect the dataset to understand its structure and contents.
   * Clean the data by handling missing values and removing irrelevant columns (e.g., ProductID).
2. **Data Preprocessing:**
   * Bin continuous variables (e.g., ProductPrice, CustomerAge) into categorical ranges to simplify analysis.
   * Encode categorical variables (e.g., ProductCategory, ProductBrand, PriceRange) using Label Encoding.
3. **Exploratory Data Analysis (EDA):**
   * Visualize the distribution of product prices, customer ages, and gender distribution to identify trends and patterns.
4. **Model Training:**
   * Select features (CustomerAge, PriceRange, CustomerGender) and target variables (ProductCategory, ProductBrand).
   * Split the data into training and testing sets for both prediction tasks.
   * Train Random Forest Classifiers to predict product category and brand.
5. **Model Evaluation:**
   * Evaluate the performance of the trained models using metrics such as classification reports.
   * Analyze feature importance to understand the impact of each feature on the predictions.
6. **Prediction Function:**
   * Develop a function that takes customer age, customer gender and price range as inputs and returns the predicted product category and brand.

**Why This Project:**  Understanding customer preferences is critical for businesses in the consumer electronics sector. This project will provide valuable insights into customer behavior and demonstrate the application of machine learning techniques in real-world scenarios.

Best regards,

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