The Islamia University of Bahawalpur

Faculty of Engineering

Department of Electronic Engineering

Certificate in Artificial Intelligence

Course: **CAI-103 Programming for Machine Learning**

Final Project: **Dashboard Design using Python**

Instructor: **Dr. M. Abbas Abbasi**

- **Project Title**: Visualizing Growth Interactive Dashboard for DVD Rental Management from Sakila Database

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Project Overview:

The project aims to create an interactive dashboard for comprehensive analysis and visualization of data sourced from the Sakila Database, a model of a DVD rental store. The primary objectives include:

1. **Dataset Exploration**: I'll dive into different rooms (like movies, actors, rentals) to see how they connect and what info they hold. Think maps and secret passages!
2. **Data Cleaning**: Before we analyze, we need to clean. Imagine polishing dusty antiques! I'll fix missing info, banish duplicates, and organize everything neatly. This ensures our analysis runs smoothly and reveals the data's true potential
3. **Dashboard Development:** Using cool Python tools, I'll create a visual HQ with charts and graphs. Imagine fancy screens showing top-rented movies, popular genres, and sneaky rental patterns!
4. **Testing and Debugging:** I'll put our dashboard through its paces to make sure it shows the data accurately and everything clicks smoothly.

5. **Final Submission:** Make everything tidy and clear, like a neatly organized treasure chest. Think charts, graphs, and explanations that anyone can understand.
6. **The goal:** Build a user-friendly map anyone can use to explore Sakila's data with ease. This way, we can help them make smart decisions, maybe even predict the next DVD blockbuster!

Dataset Selection:

The dataset selected for the dashboard is sourced from the Sakila Database. Here are the details:

Source:

Sakila, a DVD rental store database created by MySQL and open for everyone to use.

Size:

Lots of information, like thousands of movies and even more rentals!

Key Treasures:

- Movies: Titles, descriptions, rental times, ratings, genres (think comedy, action, etc.).
- Actors: Names, IDs, and other details about the stars.
- Rentals: Who rented what, when, and for how long.
- Inventory: Which DVDs are available and where they're hiding in the store.

Dashboard Framework:

Dashboard Building Tools:

- **Plotly Dash:** Imagine it as a website builder, but for data! I'll use it to design the layout of our dashboard, with different sections and interactive elements.
- **Plotly:** Think of it as a paintbrush for data. I'll use Plotly to create stunning charts and graphs, like bar charts, line plots, pie charts, and more, to show off the coolest insights.

Together, these tools will help us build an interactive dashboard that's easy for anyone to use. We can click buttons, see charts update in real-time, and discover hidden patterns in the Sakila data like true data detectives!

Key Features:

Some are the main features and functionalities intended for incorporation into the dashboard:

1. **Interactive Visualizations**: I'll use cool graphs and charts (like bars, lines, and pies) to show things like popular movies, rental trends, and what genres people love.
2. **Rental Trend Analysis**: See how rentals change over time, day by day, week by week, or even month by month!
3. **Film Analysis and Details**: Dive deep into individual movies, checking out their ratings, genres, and how long people keep them.
4. **Customer Behavior Insights**: Discover who rents the most, how long they keep movies, and who's the ultimate DVD detective!
5. **Data Filters and Selections**: Choose what data you want to see, like specific genres, actors, or rental lengths. It's like sorting a bookshelf, but for data!
6. **Inventory Status**: See which DVDs are available, how many are left, and how quickly they get rented.
7. **Responsive Design**: No matter what device you use, the dashboard will look great and be easy to navigate.

These features aim to provide users with a comprehensive view of DVD rental store data, facilitating exploration, analysis, and interpretation of trends and patterns through an intuitive and interactive dashboard interface.

Project Plan:

Provide a timeline outlining key milestones and deadlines for your project. Include tasks such as data cleaning, analysis, dashboard development, and testing.

Milestone	Date
Dataset Exploration	
Data Cleaning	
Dashboard Development	
Testing and debugging	
Final Submission	

Expected Outcome:

The expected outcome by the conclusion of the project encompasses several key achievements:

1. **Awesome Dashboard:** I'll build a super-cool dashboard that shows off all the cool things we learned about Sakila's rentals, movies, and customers. Think fancy graphs, interactive filters, and easy-to-understand charts.
2. **Rental Secrets Revealed:** I'll uncover hidden patterns in the data, like what movies are most popular, which genres people love the most, and how customers usually rent. It's like being a data detective!
3. **Data Cleaning and Preparation**: I'll polish the data, fixing missing information and making sure everything is neat and tidy. Think of it like organizing a messy room before decorating!
4. **Documentation and Presentation**: I'll write down everything we did, from the code we wrote to the cool things we found in the data. This way, anyone can understand our adventure and see how awesome the dashboard is.

By achieving these outcomes, the project aims to offer a valuable tool for visualizing and understanding the dynamics of a DVD rental store, presenting actionable insights derived from the Sakila Database in a user-friendly and accessible manner.

Resources:

1. Plotly Dash Documentation: https://dash.plotly.com/
2. Plotly Documentation: https://plotly.com/python/
3. Python Programming Tutorials:
    - Real Python: https://realpython.com/
4. SQL Tutorials:
    - W3Schools SQL Tutorial: https://www.w3schools.com/sql/
5. GitHub Repositories and Community Forums:
    - GitHub: Repositories related to "Sakila Database", "Plotly Dash", "Data Analysis" etc.

6.Stack Overflow: https://stackoverflow.com/

Conclusion:

This project plans to build a cool dashboard using Plotly Dash and Python. It'll use data from the Sakila Database, like a pretend DVD store. The goal is to make a dashboard where people can click around and see stuff like which movies are popular, when people rent the most, and what types of movies customers like.

The project's big because it helps understand how to play with data and make it easy to see patterns. It's like a hands-on lesson in using data to make smart decisions, just like managing a real DVD store. The result will be a neat dashboard with pictures and filters, showing what's happening in the DVD rental world.

So, it's not just about making a dashboard. It's a fun way to learn how data can tell stories and help businesses make better choices.