Project Instructions:

Choose a Project: Select one of the business problems from the provided list that interests you and aligns with your skills and interests.

Research Relevant Datasets: Begin by searching for datasets relevant to your chosen project from public sources such as Kaggle, UCI Machine Learning Repository, or government databases. Look for datasets that include the necessary features and target variables for training your ML model.

Data Exploration and Pre-processing: Once you have obtained a suitable dataset, perform exploratory data analysis (EDA) to understand its structure, distributions, and relationships between variables. Clean the data by handling missing values, outliers, and inconsistencies. Perform pre-processing steps such as feature scaling, encoding categorical variables, and splitting the data into training and testing sets.

Develop ML Model(s): Choose appropriate machine learning algorithms and techniques based on the nature of your project (e.g., classification, regression, clustering). Train and evaluate multiple models using cross-validation and hyper-parameter tuning to identify the best-performing model(s) for your dataset.

Build a Web Application with DASH: Utilize the DASH framework to develop a web application that integrates your trained ML model(s). Create an intuitive user interface with interactive components for user input and model predictions. Use HTML, CSS, and JavaScript to customize the design and layout of your web application.

Implement Model Deployment: Deploy your web application and ML model(s) as a web service using a platform like Render. Follow the platform's documentation and guidelines to set up the deployment environment, configure dependencies, and deploy your application to a live server.

Testing and Validation: Test your web application thoroughly to ensure that it functions as intended and provides accurate predictions based on user input. Validate the performance of your deployed ML model(s) by comparing predictions with ground truth labels or expected outcomes.

Documentation and Presentation: Document your project thoroughly, including details of the dataset, ML model(s), web application development process, and

deployment steps. Prepare a presentation to showcase your project, highlighting key findings, challenges faced, and lessons learned.

Continuous Improvement: Seek feedback from peers, instructors, and users to identify areas for improvement in your project. Iterate on your web application and ML model(s) based on feedback and new insights gained during the development and deployment process.

Reflection and Future Work: Reflect on your project experience and consider future enhancements or extensions to further enhance the functionality and performance of your web application and ML model(s). Document any ideas for future research or development in your project report.

Submission: Submit a report of your project, including a GitHub link and Web Application link.

Topics:

1. **Customer Churn Prediction:** Predict whether customers are likely to churn (cancel their subscription or leave the platform) based on their past behaviour and demographics.
2. **Product Recommendation System:** Develop a recommendation engine to suggest products or services to users based on their preferences, purchase history, and browsing behaviour.
3. **Sentiment Analysis for Customer Reviews:** Analyze customer reviews and sentiment data to categorize them as positive, negative, or neutral, providing insights for businesses to improve customer satisfaction.
4. **Employee Attrition Prediction:** Predict the likelihood of employee attrition or turnover based on factors such as job satisfaction, performance metrics, and tenure.
5. **Credit Risk Assessment:** Build a model to assess the creditworthiness of individuals or businesses and predict the risk of default on loans or credit lines.
6. **Demand Forecasting:** Forecast demand for products or services based on historical sales data, market trends, and external factors like seasonality or promotions.

7. **Fraud Detection:** Develop a fraud detection system to identify suspicious transactions or activities in financial transactions, insurance claims, or e-commerce transactions.
8. **Customer Segmentation:** Segment customers into distinct groups based on demographic, behavioural, or transactional data, allowing businesses to tailor marketing strategies and offerings.
9. **Price Optimization:** Optimize pricing strategies by analysing market trends, competitor pricing, and customer willingness to pay to maximise revenue and profitability.
10. **Inventory Management:** Develop an inventory management system to optimize stock levels, minimize stockouts, and reduce carrying costs by predicting demand and reorder quantities.
11. **Predictive Maintenance:** Predict equipment failures or maintenance needs in industrial machinery, vehicles, or infrastructure based on sensor data and historical maintenance records.
12. **Healthcare Diagnosis Prediction:** Build a diagnostic model to predict the likelihood of specific diseases or medical conditions based on patient symptoms, medical history, and diagnostic tests.
13. **Energy Consumption Forecasting:** Forecast energy consumption for residential or commercial buildings based on historical usage data, weather patterns, and occupancy schedules.
14. **Weather Forecasting:** Develop a weather forecasting model to predict temperature, precipitation, and other weather variables for specific locations and timeframes.
15. **Stock Price Prediction:** Predict stock prices or market trends based on historical stock data, company fundamentals, and market sentiment indicators.
16. **Crop Yield Prediction**: Predict crop yields for crops based on historical weather data, soil quality, and farming practices, helping farmers optimize crop management.
17. **Real Estate Price Prediction:** Predict real estate prices or property values based on location, property characteristics, market trends, and economic indicators.

18. **Customer Lifetime Value Prediction:** Predict the lifetime value of customers based on their purchasing behaviour, loyalty, and engagement with the business.
19. **Image Classification:** Develop a model to classify images as either product images or non-product images for an e-commerce platform.
20. **Supply Chain Optimization:** Use machine learning to optimize the supply chain process for a manufacturing company.
21. **Quality Control:** Use machine learning to identify defective products in a manufacturing process.
22. **Personalized Marketing**: Build a system to personalize marketing messages to customers based on their behaviour and preferences.