**TCS PACE Rapid Labs**

**Coding Interview**

**Use Case:** Product Image Analysis, Recommendation, and Description Generation Web Prototype

**Scenario:**

An e-commerce platform aims to swiftly develop a prototype that employs image analysis, NLP, and prediction to offer similar product recommendations to customers and automatically generate product descriptions. As an ML engineer with full-stack skills create a functional web application to achieve this.

**Dataset:**

* fashion.csv - Find attached the fashion.csv file with product descriptions and links to product images. Use this dataset to download the images and work on the dataset.
* test\_images.zip – use the images in this folder to test the application

**Task:**

**Backend Development and Data Setup**

* **Data Preparation:** Utilize the dataset containing product information such as ProductId, Category, SubCategory, Color, ProductTitle, and ImageURL.
* **Image Analysis:** Integrate a pre-trained image analysis model into the backend to extract relevant features from images.
* **Key Detail Prediction:** Develop a model that predicts key product details (Category, SubCategory, Color, ProductType, Usage) based on uploaded images.
* **Description Generation:** Create an NLP model for generating product descriptions using product information.
* **Recommendations Display:** Implement a section on the webpage to display recommended products based on the input product's image features and categorical attributes.
* **API Creation:** Develop backend API endpoints to accept uploaded images, predict key details, generate descriptions, and provide recommended product information.

**Frontend Development and Integration**

* **Frontend Interface:** Use web technologies (HTML, CSS, JavaScript) to design an intuitive user interface.
* **Image Upload:** Implement a section where users can upload product images for analysis and recommendation.
* **Key Details Display:** Display predicted key product details (Category, SubCategory, Color, ProductType, Usage) based on the uploaded image.
* **Description Display:** Showcase the generated product description based on the predicted details.
* **Recommendations Display:** Integrate a section to show recommended products based on the uploaded image's predicted details.
* **Backend Integration:** Establish a connection between the frontend and backend APIs to enable image upload, key detail prediction, description generation, and recommendations.

**Deployment and Testing:**

* **Local Deployment:** Deploy the application locally to demonstrate its functionality.
* **Testing:** Test the system with various product images to ensure accurate predictions, description generation, and recommendations. **Test using the images provided in the test\_images folder and show the result.**

**Considerations:**

* The solution will focus on core functionalities.
* The frontend design should prioritize functionality and usability.
* The solution should showcase the combined potential of image analysis, NLP, and prediction for generating recommendations and descriptions in an e-commerce context.
* Generate accurate product descriptions and recommendations based on uploaded images.

**Deliverables**: You are expected to submit the following:

* Jupyter Notebook or colab link or Python script containing the code for data preprocessing, model training, and evaluation – for all models used in the code.
* A screen recording of the full web application that you developed showcasing the functionality.
* A brief report discussing the architecture, the methodology for collecting user feedback on generated results to iteratively improve accuracy, Deployment Strategy of this application in Microsoft azure platform.