### **Fashion Visual Search & Intelligent Styling Assistant**

**Industry Context** The global fashion e-commerce market faces a critical challenge: 65% of potential customers abandon their shopping journey because they cannot find the specific items they're looking for. Traditional text-based search fails to capture the nuanced visual elements that drive fashion purchases - color shades, patterns, textures, and styling details that are difficult to describe in words.

**Problem Statement** Design and build an end-to-end machine learning system that enables visual search for fashion items and provides intelligent outfit recommendations. Users should be able to upload any fashion image (from social media, street photography, or their own wardrobe) and receive:

* Exact and Visually similar products from available inventory
* Complete outfit suggestions that complement the searched item
* Personalized recommendations based on their search patterns

**Key Challenges to Address**

1. **Visual Similarity at Scale**: Process and match fashion items across millions of products close to real-time.
2. **Multi-Modal Understanding**: Combine visual features (color, pattern, silhouette) with metadata (category, brand, price) for accurate matching
3. **Style Compatibility**: Develop algorithms to understand which items work well together beyond simple rules
4. **Trend Awareness**: Incorporate current fashion trends into recommendations without manual intervention
5. **User Experience**: Create an intuitive interface that works across devices and handles various image qualities

**Expected Outcomes**

* Functional visual search system with >85% success rate.
* Outfit recommendation engine, recommending only the best fits in an ordinal way
* A working prototype of the solution along with the code used for the same also needs to be a part of the submission.

**Bonus Outcomes**

* Scalable architecture (**design only)** capable of handling 10,000+ concurrent users and over 1000 API calls a minute.

**Data**

* Data to be used for the prototype - [Drive Link](https://drive.google.com/drive/u/0/folders/1NMu_ZjcXQgeUYJtzYq4LJ3Zgml7xhEQ9)

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### **Dataset Columns Explanation**

* **selling\_price**: The current selling price of the product, usually in INR (Indian Rupees), stored as a dictionary with the currency key.
* **discount**: The discount percentage applied on the product’s MRP (Maximum Retail Price).
* **category\_id**: Numeric identifier for the product category (e.g., dresses).
* **meta\_info**: Short descriptive text about the product’s fit, style, size guide, or other key selling points.
* **product\_id**: A unique hash-based identifier for each product.
* **pdp\_url**: URL to the product detail page on the retailer’s website.
* **sku**: Stock Keeping Unit, a unique product code used for inventory management.
* **brand**: Brand name of the product.
* **department\_id**: Numeric code indicating the broader department the product belongs to (e.g., women’s apparel).
* **last\_seen\_date**: The most recent date when the product was observed or crawled on the retailer’s site.
* **launch\_on**: The date when the product was first launched or added to the inventory.
* **mrp**: The Maximum Retail Price of the product, stored as a dictionary with currency information.
* **product\_name**: The commercial name/title of the product.
* **feature\_image\_s3**: URL link to the main product image hosted on the Stylumia image storage.(use this url if you want to download images )
* **channel\_id**: Numeric ID representing the retailer.
* **feature\_list**: List of key features and design attributes of the product.
* **description**: Detailed textual description of the product, including style, usage, and other marketing information.
* **style\_attributes**: A JSON/dictionary containing additional style metadata.
* **pdp\_images\_s3**: List of URLs for additional product images stored on the Stylumia image repository. (use this url if you want to download images )