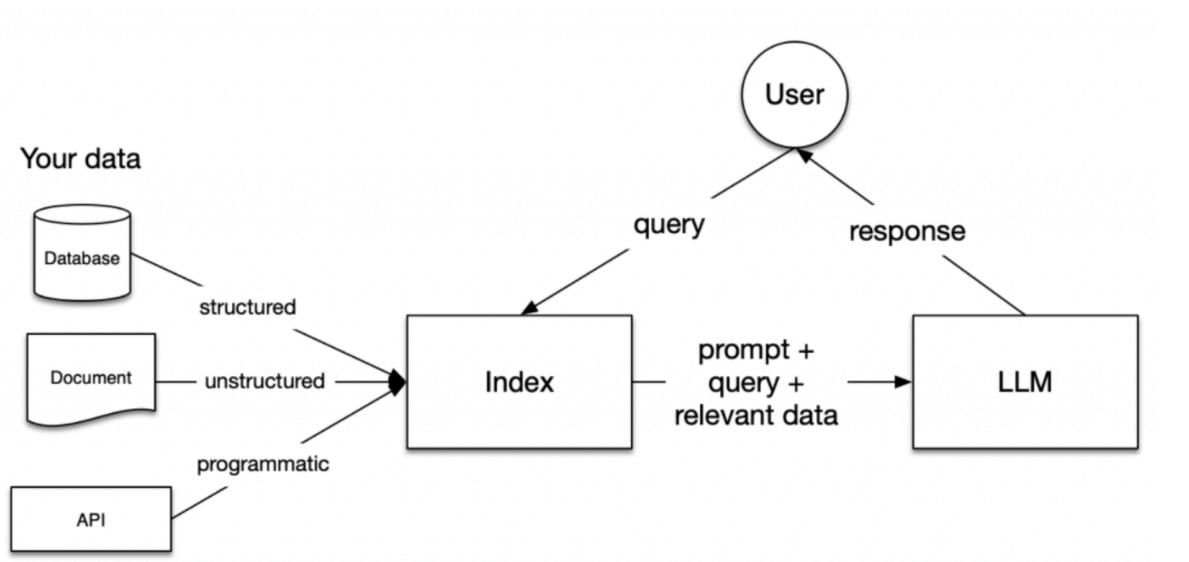


# Fashion Search AI - RAG with LlamalIndex

BYOP - Myntra Dataset

(<https://www.kaggle.com/datasets/djagatiya/myntra-fashion-product-dataset>)

## 1. Architecture



### Stages within RAG

There are five key stages within RAG, which in turn will be a part of any larger application you build. These are:

**Loading:** this refers to getting your data from where it lives – whether it's text files, PDFs, another website, a database, or an API – into your pipeline. LlamaHub provides hundreds of connectors to choose from.

**Indexing:** this means creating a data structure that allows for querying the data. For LLMs this nearly always means creating vector embeddings, numerical representations of the meaning of your data, as well as numerous other metadata strategies to make it easy to accurately find contextually relevant data.

**Storing:** Once your data is indexed, you will want to store your index, along with any other metadata, to avoid the need to re-index it.

**Querying:** for any given indexing strategy there are many ways you can utilize LLMs and LlamaIndex data structures to query, including sub-queries, multi-step queries and hybrid strategies.

## 2. Layers in the RAG model:

### a. Embedding Layer:

We are indexing based on the metadata( which combination of the price, description, color, brand etc.) . By default LlamaIndex uses **text-embedding-ada-002**. We are using chunking with a **chunk size of 1000** and for caching using **diskcache**.

#### Layer 1: Embedding Layer

Load Data and Build Index.

By default LlamaIndex uses **text-embedding-ada-002**

```
[13]: from llama_index.core import Document

[14]: # Convert each row into a Document
       documents = []
       for _, row in myntra_data.iterrows():
           metadata = row['metadata'] # Access the metadata dictionary
           documents.append(Document(metadata=metadata))
#documents
```

Node parser with chunking - chunk size=1000

```
[15]: # Define an LLM
       llm = OpenAI(model="gpt-3.5-turbo")

       # Build index with a chunk_size of 512
       node_parser = SimpleNodeParser.from_defaults(chunk_size=1000)
       nodes = node_parser.get_nodes_from_documents(documents)
```

Caching using diskcache

```
5]: import diskcache
       CACHE_DIR = "./index_cache"
       os.makedirs(CACHE_DIR, exist_ok=True)
       cache = diskcache.Cache(CACHE_DIR)

       def get_or_create_index(nodes):
           if "vector_index" in cache:
               print('found in cache')
               return cache["vector_index"]

           vector_index = VectorStoreIndex(nodes)
           cache["vector_index"] = vector_index
           return vector_index

5]: vector_index = get_or_create_index(nodes)
       found in cache
3]: vector_index
3]: <llama_index.core.indices.vector_store.base.VectorStoreIndex at 0x3a024c250>
```

## b. Search Layer:

Grabs the top 3 most relevant results from a LlamalIndex vector store based on a user's query. Refines the initial results by calculating sentence embedding similarity between the query and the content of the retrieved nodes. For re-ranking use “**“all-MiniLM-L6-v2”** as sentence transformer.

```
def display_images_from_nodes_withDescription_sentence_transformer(image_folder: str, query_string: str = None, metadata_key: str = "Product_id"):
    """
    Displays images, metadata, and performs vector distance re-ranking using sentence-transformers,
    all in a single screen using HTML with compact key-value pairs.
    """
    response_vector = query_engine.query(query_string)
    source_nodes = response_vector.source_nodes

    embed_model = SentenceTransformer('all-MiniLM-L6-v2')

    if query_string:
        query_embedding = embed_model.encode(query_string, convert_to_tensor=True)
        node_embeddings = [embed_model.encode(node.get_content(), convert_to_tensor=True) for node in source_nodes]
        distances = [np.dot(query_embedding.cpu().numpy(), node_embedding.cpu().numpy()) for node_embedding in node_embeddings]
        sorted_nodes = [node for _, node in sorted(zip(distances, source_nodes), key=lambda x: x[0], reverse=True)]
    else:
        sorted_nodes = source_nodes

    html_output = "<div>" # Start of main div for grid layout
    for i, node in enumerate(sorted_nodes, 1):
        html_output += "<div style='display: inline-block; vertical-align: top; margin: 10px;'>" # Start of individual item div

        # Node Text
        html_output += f"<p><strong>Result {i}:</strong><br>{node.text}</p>"

        # Metadata Table (compact styling)
        metadata_html = "<table style='font-size: 12px; border-collapse: collapse;'>"
        for key, value in node.metadata.items():
            metadata_html += f"<tr><td style='border: 1px solid #ddd; padding: 4px;'>{key}</td><td style='border: 1px solid #ddd; padding: 4px;'>{value}</td></tr>"
        metadata_html += "</table>"
        html_output += metadata_html

        # Image
        image_id = node.metadata.get(metadata_key)
        if image_id:
            image_path = os.path.join(image_folder, f"{image_id}{image_extension}")
            if os.path.exists(image_path):
                html_output += f"<img src='{image_path}' style='max-width: 200px; max-height: 200px;'/><br>"
            else:
                html_output += f"<p>Image not found for {metadata_key}: {image_id}</p>"
        else:
            html_output += f"<p>{metadata_key} not found in metadata.</p>"

        html_output += "</div>" # End of individual item div

    html_output += "</div>" # End of main div
    display(HTML(html_output))
```

**Query 1:** "I need a yellow Kurta under budget 4000"

```
[121]: query_string1 = "I need a yellow Kurta under budget 4000"  
[122]: display_images_from_nodes_withDescription_sentence_transformer(image_folder, query_string1, "Product_id", ".jpg")
```

Result 1:

Product_id	16334264
Name	KETCH Women Yellow Printed Kurta
Product_type	Kurta
Price_INR	1049.0
Colour	Yellow
Brand	KETCH
RatingCount	29.0
Rating	3.896551724137931
Description	<p>• Colour: yellow • Abstract printed • Round neck • Three-quarter, regular sleeves • Straight shape with regular style • Calf length with straight hem • Machine weave regular polyester • Polyester • Machine wash The model (height 5'8") is wearing a size S</p> <p>{'Body Shape ID': '424', 'Body or Garment Size': 'Garment Measurements in', 'Care for me': 'Follow the garment wash care label\n \n Can be tumble dried in a cool setting if machine washed\n \n Prevent static build-up by drying while damp\n \n Use low heat to iron', 'Colour Family': 'Bright', 'Design Styling': 'Regular', 'Fabric': 'Polyester', 'Fabric 2': 'NA', 'Fabric Purity': 'Pure', 'Hemline': 'Straight', 'Length': 'Calf Length', 'Main Trend': 'NA', 'Neck': 'Round Neck', 'Number of Pockets': 'NA', 'Occasion': 'Daily', 'Ornamentation': 'NA', 'Pattern': 'Printed', 'Print or Pattern Type': 'Abstract', 'Shape': 'Straight', 'Sleeve Length': 'Three-Quarter Sleeves', 'Sleeve Styling': 'Regular Sleeves', 'Slit Detail': 'Side Slits', 'Stitch': 'Ready to Wear', 'Sustainable': 'Regular', 'Technique': 'NA', 'Wash Care': 'Machine Wash', 'Weave Pattern': 'Regular', 'Weave Type': 'Machine Weave'}</p>
Product_attributes	



```
[121]: query_string1 = "I need a yellow Kurta under budget 4000"  
[122]: display_images_from_nodes_withDescription_sentence_transformer(image_folder, query_string1, "Product_id", ".jpg")
```



Result 2:

Product_id	11349574
Name	W Women Yellow & Golden Printed Straight Kurta
Product_type	Kurta
Price_INR	1699.0
Colour	Yellow
Brand	W
RatingCount	21.0
Rating	4.333333333333333
Description	<p>Yellow and Golden printed straight kurta, has a round neck, three-quarter sleeves, button closure, straight hem, and side slitsThe model (height 5'8") is wearing a size S</p> <p>{'Body Shape ID': '424', 'Body or Garment Size': 'To Fit Denotes Body Measurements in', 'Colour Family': 'Bright', 'Design Styling': 'Regular', 'Fabric': 'Viscose Rayon', 'Fabric 2': 'NA', 'Fabric Purity': 'Synthetic', 'Hemline': 'Straight', 'Length': 'Knee Length', 'Main Trend': 'NA', 'Neck': 'Round Neck', 'Occasion': 'Daily', 'Ornamentation': 'NA', 'Pattern': 'Printed', 'Print or Pattern Type': 'Geometric', 'Shape': 'Straight', 'Sleeve Length': 'Three-Quarter Sleeves', 'Sleeve Styling': 'Regular Sleeves', 'Slit Detail': 'Side Slits', 'Stitch': 'Ready to Wear', 'Sustainable': 'Regular', 'Technique': 'NA', 'Wash Care': 'Hand Wash', 'Weave Pattern': 'Regular', 'Weave Type': 'Machine Weave'}</p>
Product_attributes	



**Result 3:**

Product_id	12831164
Name	Vishudh Women Yellow & Black Printed Straight Kurta
Product_type	Kurta
Price_INR	1399.0
Colour	Yellow
Brand	Vishudh
RatingCount	382.0
Rating	4.06282722513089
Description	Yellow and Black printed straight kurta, has a round neck, three-quarter sleeves, straight hem, and side slitsThe model (height 5'8") is wearing a size SMaterial: Cotton Machine Wash
Product_attributes	{'Body Shape ID': '424', 'Body or Garment Size': 'Garment Measurements in', 'Colour Family': 'Bright', 'Design Styling': 'Regular', 'Fabric': 'Cotton', 'Fabric 2': 'NA', 'Fabric Purity': 'Pure', 'Hemline': 'Straight', 'Length': 'Calf Length', 'Main Trend': 'NA', 'Neck': 'Round Neck', 'Occasion': 'Daily', 'Ornamentation': 'NA', 'Pattern': 'Printed', 'Print or Pattern Type': 'Abstract', 'Shape': 'Straight', 'Sleeve Length': 'Three-Quarter Sleeves', 'Sleeve Styling': 'Regular Sleeves', 'Slit Detail': 'Side Slits', 'Stitch': 'Ready to Wear', 'Sustainable': 'Regular', 'Technique': 'NA', 'Wash Care': 'Machine Wash', 'Weave Pattern': 'Regular', 'Weave Type': 'Machine Weave'}



**Query 2:** "I need a Kurta from brand Anouk either yellow or pink in color"

```
query_string2 = "I need a Kurta from brand Anouk either yellow or pink in color"
display_images_from_nodes_withDescription_sentence_transformer(image_folder, query_string2, "Product_id", ".jpg")
```

**Result 1:**

Product_id	17100808
Name	Anouk Women Pink & Yellow Checked Pure Cotton Kurta
Product_type	Kurta
Price_INR	1099.0
Colour	Pink
Brand	Anouk
RatingCount	21.0
Rating	3.952380952380953
Description	<ul style="list-style-type: none"> <li>• Colour: pink and yellow</li> <li>• Checked</li> <li>• V-neck</li> <li>• Three-quarter, regular sleeves</li> <li>• Straight shape with regular style</li> <li>• Calf length with straight hem</li> <li>• Machine weave regular cotton</li> </ul> <p>The model (height 5'8) is wearing a size S100% Cotton Machine wash</p>
Product_attributes	{'Body Shape ID': '424', 'Body or Garment Size': 'To-Fit Denotes Body Measurements in', 'Care for me': 'NA', 'Colour Family': 'Bright', 'Design Styling': 'Regular', 'Fabric': 'Cotton', 'Fabric 2': 'NA', 'Fabric Purity': 'Pure', 'Hemline': 'Straight', 'Length': 'Calf Length', 'Main Trend': 'NA', 'Neck': 'V-Neck', 'Number of Pockets': 'NA', 'Occasion': 'Daily', 'Ornamentation': 'NA', 'Pattern': 'Checked', 'Print or Pattern Type': 'Checked', 'Shape': 'Straight', 'Sleeve Length': 'Three-Quarter Sleeves', 'Sleeve Styling': 'Regular Sleeves', 'Slit Detail': 'Side Slits', 'Stitch': 'Ready to Wear', 'Sustainable': 'Regular', 'Technique': 'NA', 'Wash Care': 'Machine Wash', 'Weave Pattern': 'Regular', 'Weave Type': 'Machine Weave', 'Wedding': 'Guests & Gifting'}



```
query_string2 = "I need a Kurta from brand Anouk either yellow or pink in color"
display_images_from_nodes_withDescription_sentence_transformer(image_folder, query_string2, "Product_id", ".jpg")
```

**Result 2:**

Product_id	17090738
Name	Anouk Women Pink Woven Design Pleated Kurta
Product_type	Kurta
Price_INR	2399.0
Colour	Pink
Brand	Anouk
RatingCount	54.0
Rating	4.111111111111111
Description	<ul style="list-style-type: none"> <li>• Colour: pink</li> <li>• Woven design woven design</li> <li>• Mandarin collar</li> <li>• Three-quarter, regular sleeves</li> <li>• Straight shape with pleated style</li> <li>• Calf length with straight hem</li> <li>• Machine weave regular cotton</li> <li>• 100% Cotton</li> <li>• Hand wash</li> <li>• Size worn by the model: S</li> <li>• Chest: 29"</li> <li>• Height: 5'6"</li> </ul>
Product_attributes	{'Body Shape ID': '424', 'Body or Garment Size': 'To-Fit Denotes Body Measurements in', 'Care for me': 'NA', 'Colour Family': 'Bright', 'Design Styling': 'Pleated', 'Fabric': 'Cotton', 'Fabric 2': 'NA', 'Fabric Purity': 'Pure', 'Hemline': 'Straight', 'Length': 'Calf Length', 'Main Trend': 'NA', 'Neck': 'Mandarin Collar', 'Number of Pockets': 'NA', 'Occasion': 'Daily', 'Ornamentation': 'NA', 'Pattern': 'Woven Design', 'Print or Pattern Type': 'Woven Design', 'Shape': 'Straight', 'Sleeve Length': 'Three-Quarter Sleeves', 'Sleeve Styling': 'Regular Sleeves', 'Slit Detail': 'Multiple Slits', 'Stitch': 'Ready to Wear', 'Sustainable': 'Regular', 'Technique': 'NA', 'Wash Care': 'Hand Wash', 'Weave Pattern': 'Regular', 'Weave Type': 'Machine Weave', 'Wedding': 'NA'}



```
query_string2 = "I need a Kurta from brand Anouk either yellow or pink in color"
display_images_from_nodes_withDescription_sentence_transformer(image_folder, query_string2, "Product_id", ".jpg")
```

**Result 3:**

Product_id	13905652
Name	Anouk Women Pink & Off White Ethnic Motifs Printed Straight Kurta
Product_type	Kurta
Price_INR	899.0
Colour	Pink
Brand	Anouk
RatingCount	1152.0
Rating	3.9947916666666665
Description	<ul style="list-style-type: none"> <li>• Colour: pink and off white</li> <li>• Ethnic motifs printed</li> <li>• Round neck</li> <li>• Three-quarter, regular sleeves</li> <li>• Straight shape with regular style</li> <li>• Calf length with straight hem</li> <li>• Machine weave regular cotton</li> </ul> <p>The model (height 5'8) is wearing a size SCotton Machine wash</p>
Product_attributes	{'Body Shape ID': '424', 'Body or Garment Size': 'To-Fit Denotes Body Measurements in', 'Colour Family': 'Pastel', 'Design Styling': 'Regular', 'Fabric': 'Cotton', 'Fabric 2': 'NA', 'Fabric Purity': 'Pure', 'Hemline': 'Straight', 'Length': 'Calf Length', 'Main Trend': 'NA', 'Neck': 'Round Neck', 'Number of Pockets': 'NA', 'Occasion': 'Dally', 'Ornamentation': 'NA', 'Pattern': 'Printed', 'Print or Pattern Type': 'Ethnic Motifs', 'Shape': 'Straight', 'Sleeve Length': 'Three-Quarter Sleeves', 'Sleeve Styling': 'Regular Sleeves', 'Slit Detail': 'Side Slits', 'Stitch': 'Ready to Wear', 'Sustainable': 'Regular', 'Technique': 'NA', 'Wash Care': 'Machine Wash', 'Weave Pattern': 'Regular', 'Weave Type': 'Machine Weave'}



**Query 3:** "Please show me some Kurtas combined with Palazzos, I will prefer printed pattern"

```
[126]: query_string3 = "Please show me some Kurtas combined with Palazzos, I will prefer printed pattern"
display_images_from_nodes_withDescription_sentence_transformer(image_folder, query_string3, "Product_id", ".jpg")
```

**Result 1:**

Product_id	17048614
Name	Khushal K Women Black Ethnic Motifs Printed Kurta with Palazzos & With Dupatta
Product_type	Kurta, Palazzos, Dupatta
Price_INR	5099.0
Colour	Black
Brand	Khushal K
RatingCount	4522.0
Rating	4.418398938522775
	Black printed Kurta with Palazzos with dupatta
Description	<p><b>Kurta design:</b></p> <ul style="list-style-type: none"> <li>Ethnic motifs printed</li> <li>Anarkali shape</li> <li>Regular style</li> <li>Mandarin collar, three-quarter regular sleeves</li> <li>Calf length with flared hem</li> <li>Viscose rayon machine weave fabric</li> </ul> <p><b>Palazzos design:</b></p> <ul style="list-style-type: none"> <li>Printed Palazzos</li> <li>Elasticated waistband</li> <li>Slip-on closure</li> </ul> <p>Dupatta Length 2.43 meters Width: 88 cm  The model (height 5'8) is wearing a size S100% Rayon  Machine wash</p>
Product_attributes	{'Add-Ons': 'NA', 'Body Shape ID': '443,333,324,424', 'Body or Garment Size': 'Garment Measurements in', 'Bottom Closure': 'Slip-On', 'Bottom Fabric': 'Viscose Rayon', 'Bottom Pattern': 'Printed', 'Bottom Type': 'Palazzos', 'Character': 'NA', 'Dupatta': 'With Dupatta', 'Dupatta Border': 'Solid', 'Dupatta Fabric': 'Viscose Rayon', 'Dupatta Pattern': 'Printed', 'Main Trend': 'Indie Prints', 'Neck': 'Mandarin Collar', 'Number of Pockets': 'NA', 'Occasion': 'Festive', 'Ornamentation': 'NA', 'Pattern Coverage': 'Placement', 'Print or Pattern Type': 'Ethnic Motifs', 'Sleeve Length': 'Three-Quarter Sleeves', 'Sleeve Styling': 'Regular Sleeves', 'Slit Detail': 'NA', 'Stitch': 'Ready to Wear', 'Sustainable': 'Regular', 'Technique': 'Screen', 'Top Design Styling': 'Regular', 'Top Fabric': 'Viscose Rayon', 'Top Hemline': 'Flared', 'Top Length': 'Calf Length', 'Top Pattern': 'Printed', 'Top Shape': 'Anarkali', 'Top Type': 'Kurta', 'Waistband': 'Elasticated', 'Wash Care': 'Machine Wash', 'Weave Pattern': 'Regular', 'Weave Type': 'Machine Weave'}



```
[126]: query_string3 = "Please show me some Kurtas combined with Palazzos, I will prefer printed pattern"
display_images_from_nodes_withDescription_sentence_transformer(image_folder, query_string3, "Product_id", ".jpg")
```

**Result 2:**

Product_id	19241696
Name	max Women Blue Printed Kurti with Palazzos
Product_type	Kurti, Palazzos
Price_INR	999.0
Colour	Blue
Brand	max
RatingCount	nan
Rating	nan
Description	<p>Blue printed Kurti with Palazzos</p> <p><b>Kurti design:</b></p> <ul style="list-style-type: none"> <li>• Geometric printed A-line shape</li> <li>• V-neck, three-quarter flared sleeves</li> <li>• Na pockets</li> <li>• Calf length with curved hem</li> <li>• Viscose rayon knitted and woven fabric</li> </ul> <p><b>Palazzos design:</b></p> <ul style="list-style-type: none"> <li>• Printed Palazzos Slip-on closure</li> <li>• 100% RAYON</li> <li>• Machine washThe model (height 5'8) is wearing a size S</li> </ul> <p>{'Add-Ons': 'NA', 'Body Shape ID': '443,333,324,424', 'Body or Garment Size': 'Garment Measurements in', 'Bottom Closure': 'Slip-On', 'Bottom Fabric': 'Viscose Rayon', 'Bottom Pattern': 'Printed', 'Bottom Type': 'Palazzos', 'Character': 'NA', 'Dupatta': 'NA', 'Dupatta Border': 'Printed', 'Dupatta Fabric': 'NA', 'Dupatta Pattern': 'Solid', 'Main Trend': 'Indie Prints', 'Neck': 'V-Neck', 'Number of Pockets': 'NA', 'Occasion': 'Daily', 'Ornamentation': 'NA', 'Pattern Coverage': 'Large', 'Print or Pattern Type': 'Geometric', 'Sleeve Length': 'Three-Quarter Sleeves', 'Sleeve Styling': 'Flared Sleeves', 'Slit Detail': 'Multiple Slits', 'Stitch': 'Ready to Wear', 'Sustainable': 'Regular', 'Technique': 'NA', 'Top Design Styling': 'Angrakha', 'Top Fabric': 'Viscose Rayon', 'Top Hemline': 'Curved', 'Top Length': 'Calf Length', 'Top Pattern': 'Printed', 'Top Shape': 'A-Line', 'Top Type': 'Kurti', 'Waistband': 'NA', 'Wash Care': 'Machine Wash', 'Weave Pattern': 'Regular', 'Weave Type': 'Knitted and Woven', 'Wedding': 'NA'}</p>
Product_attributes	

Result 3:

Product_id	17048604
Name	Khushal K Women Green & Pink Printed Pure Cotton Kurta with Palazzos & Dupatta
Product_type	Kurta, Palazzos, Dupatta
Price_INR	5299.0
Colour	Green
Brand	Khushal K
RatingCount	1590.0
Rating	4.266037735849056
Description	<ul style="list-style-type: none"> <li>• Ethnic motifs printed A-line shape Regular style Round neck, three-quarter regular sleeves Gotta patti detail Calf length with flared hem Pure cotton machine weave fabric</li> <li>• Kurta design: Printed Palazzos Elasticated waistband Slip-on closure Comes with pink solid dupatta</li> <li>• Dupatta: 2.4 x 0.8 meters The model (height 5'8) is wearing a size S Top: 100% Cotton Bottom: 100% Cotton Dupatta: Silk Chiffon Machine wash</li> </ul>
Product_attributes	<p>{'Add-Ons': 'NA', 'Body Shape ID': '443,333,324,424', 'Body or Garment Size': 'Garment Measurements in', 'Bottom Closure': 'Slip-On', 'Bottom Fabric': 'Pure Cotton', 'Bottom Pattern': 'Printed', 'Bottom Type': 'Palazzos', 'Character': 'NA', 'Dupatta': 'With Dupatta', 'Dupatta Border': 'Taping', 'Dupatta Fabric': 'Silk Chiffon', 'Dupatta Pattern': 'Solid', 'Main Trend': 'NA', 'Neck': 'Round Neck', 'Number of Pockets': 'NA', 'Occasion': 'Daily', 'Ornamentation': 'Gotta Patti', 'Pattern Coverage': 'Large', 'Print or Pattern Type': 'Ethnic Motifs', 'Sleeve Length': 'Three-Quarter Sleeves', 'Sleeve Styling': 'Regular Sleeves', 'Slit Detail': 'NA', 'Stitch': 'Ready to Wear', 'Sustainable': 'Regular', 'Technique': 'NA', 'Top Design Styling': 'Regular', 'Top Fabric': 'Pure Cotton', 'Top Hemline': 'Flared', 'Top Length': 'Calf Length', 'Top Pattern': 'Printed', 'Top Shape': 'A-Line', 'Top Type': 'Kurta', 'Waistband': 'Elasticated', 'Wash Care': 'Machine Wash', 'Weave Pattern': 'Regular', 'Weave Type': 'Machine Weave', 'Wedding': 'Guests &amp; Gifting'}</p> 

### c. Generative Layer:

Takes a user's fashion-related query, retrieves the top three relevant fashion products from a vector store, formats these product details into a user-friendly text prompt, sends this prompt to **OpenAI's GPT-3.5** model to generate a conversational response, prints the generated response, and then separately displays the images of the retrieved products.

```

import openai

def generate_response_fashion(query, image_folder):
    Generates a response using GPT-3.5's ChatCompletion based on the user query and retrieved fashion items, and then displays the images separately.
    Args:
        query (str): User's fashion-related query.
        image_folder (str): Path to the folder containing product images.
    Returns:
        ... The LLM-generated response.

# Step 1: Fetch the top 3 relevant fashion products
response_vector = query_engine.query(query)
source_nodes = response_vector.source_nodes[:3] # Taking top 3 results
product_details = []
for node in source_nodes:
    for product in node.products:
        product_details.append({
            "Name": (node.metadata['name']), "\n",
            "Brand": (node.metadata['brand']), "\n",
            "Price": (node.metadata['price_inr']) INR\n",
            "Product_ID": (node.metadata['product_id'])})
product_details.append(product_info)

product_text = "\n".join(product_details)

# Step 2: Generate response using OpenAI
messages = [
    {"role": "system", "content": "...You are a helpful AI assistant in the fashion domain, specialized in providing fashion recommendations."},
    {"role": "user", "content": f"\n{query}\nBased on their query, here are the top 3 matching products:\n{product_text}\nGenerate a concise, engaging response recommending these products.\nKeep the response user-friendly and cite the product names and brands.\nMention that images are displayed below.\n..."}]

response = openai.ChatCompletion.create(
    model="gpt-3.5-turbo",
    messages=messages,
    temperature=0.5
)
generated_text = response.choices[0].message.content

# Step 3: Print the response
print(generated_text)
print("\n")

# Step 4: Display Images separately
display_images_from_nodes_with_description_sentence_transformer(image_folder, query)

return generated_text

```

## Query 1: "I need a yellow Kurta under budget 4000"

```
[128]: generate_response_fashion(query_string1, image_folder)
```

Generated Fashion Assistant Response:

Absolutely! Here are some fabulous yellow Kurtas under your budget of 4000 INR:

1. \*\*KETCH Women Yellow Printed Kurta\*\* by KETCH - Price: 1049.0 INR
2. \*\*W Women Yellow & Golden Printed Straight Kurta\*\* by W - Price: 1699.0 INR
3. \*\*Vishudh Women Yellow & Black Printed Straight Kurta\*\* by Vishudh - Price: 1399.0 INR

Feel free to take a closer look at the images below for these trendy Kurtas.

=====

Result 1:

Product_id	16334264
Name	KETCH Women Yellow Printed Kurta
Product_type	Kurta
Price_INR	1049.0
Colour	Yellow
Brand	KETCH
RatingCount	29.0
Rating	3.896551724137931
Description	<p>• Colour: yellow • Abstract printed • Round neck • Three-quarter, regular sleeves • Straight shape with regular style • Calf length with straight hem • Machine weave regular polyester • Polyester • Machine wash The model (height 5'8) is wearing a size S</p> <p>{'Body Shape ID': '424', 'Body or Garment Size': 'Garment Measurements in', 'Care for me': 'Follow the garment wash care label '\r\nCan be tumble dried in a cool setting if machine washed '\r\nPrevent static build-up by drying while damp '\r\nUse low heat to iron', 'Colour Family': 'Bright', 'Design Styling': 'Regular', 'Fabric': 'Polyester', 'Fabric 2': 'NA', 'Fabric Purity': 'Pure', 'Hemline': 'Straight', 'Length': 'Calf Length', 'Main Trend': 'NA', 'Neck': 'Round Neck', 'Number of Pockets': 'NA', 'Occasion': 'Daily', 'Ornamentation': 'NA', 'Pattern': 'Printed', 'Print or Pattern Type': 'Abstract', 'Shape': 'Straight', 'Sleeve Length': 'Three-Quarter Sleeves', 'Sleeve Styling': 'Regular Sleeves', 'Slit Detail': 'Side Slits', 'Stitch': 'Ready to Wear', 'Sustainable': 'Regular', 'Technique': 'NA', 'Wash Care': 'Machine Wash', 'Weave Pattern': 'Regular', 'Weave Type': 'Machine Weave'}</p>
Product_attributes	<p>• Use low heat to iron • Colour Family: Bright • Design Styling: Regular • Fabric: Polyester • Fabric 2: NA • Fabric Purity: Pure • Hemline: Straight • Length: Calf Length • Main Trend: NA • Neck: Round Neck • Number of Pockets: NA • Occasion: Daily • Ornamentation: NA • Pattern: Printed • Print or Pattern Type: Abstract • Shape: Straight • Sleeve Length: Three-Quarter Sleeves • Sleeve Styling: Regular Sleeves • Slit Detail: Side Slits • Stitch: Ready to Wear • Sustainable: Regular • Technique: NA • Wash Care: Machine Wash • Weave Pattern: Regular • Weave Type: Machine Weave</p>



**Result 2:**

Product_id	11349574
Name	W Women Yellow & Golden Printed Straight Kurta
Product_type	Kurta
Price_INR	1699.0
Colour	Yellow
Brand	W
RatingCount	21.0
Rating	4.333333333333333
Description	Yellow and Golden printed straight kurta, has a round neck, three-quarter sleeves, button closure, straight hem, and side slitsThe model (height 5'8") is wearing a size SMaterial: 100% Viscose Rayon Hand Wash
Product_attributes	{"Body Shape ID": "424", "Body or Garment Size": "To-Fit Denotes Body Measurements in", "Colour Family": "Bright", "Design Styling": "Regular", "Fabric": "Viscose Rayon", "Fabric 2": "NA", "Fabric Purity": "Synthetic", "Hemline": "Straight", "Length": "Knee Length", "Main Trend": "NA", "Neck": "Round Neck", "Occasion": "Daily", "Ornamentation": "NA", "Pattern": "Printed", "Print or Pattern Type": "Geometric", "Shape": "Straight", "Sleeve Length": "Three-Quarter Sleeves", "Sleeve Styling": "Regular Sleeves", "Slit Detail": "Side Slits", "Stitch": "Ready to Wear", "Sustainable": "Regular", "Technique": "NA", "Wash Care": "Hand Wash", "Weave Pattern": "Regular", "Weave Type": "Machine Weave"}



**Result 3:**

Product_id	12831164
Name	Vishudh Women Yellow & Black Printed Straight Kurta
Product_type	Kurta
Price_INR	1399.0
Colour	Yellow
Brand	Vishudh
RatingCount	382.0
Rating	4.06282722513089
Description	Yellow and Black printed straight kurta, has a round neck, three-quarter sleeves, straight hem, and side slitsThe model (height 5'9") is wearing a size SMaterial: Cotton Machine Wash
Product_attributes	{"Body Shape ID": "424", "Body or Garment Size": "Garment Measurements in", "Colour Family": "Bright", "Design Styling": "Regular", "Fabric": "Cotton", "Fabric 2": "NA", "Fabric Purity": "Pure", "Hemline": "Straight", "Length": "Calf Length", "Main Trend": "NA", "Neck": "Round Neck", "Occasion": "Daily", "Ornamentation": "NA", "Pattern": "Printed", "Print or Pattern Type": "Abstract", "Shape": "Straight", "Sleeve Length": "Three-Quarter Sleeves", "Sleeve Styling": "Regular Sleeves", "Slit Detail": "Side Slits", "Stitch": "Ready to Wear", "Sustainable": "Regular", "Technique": "NA", "Wash Care": "Machine Wash", "Weave Pattern": "Regular", "Weave Type": "Machine Weave"}



**Query 2:** "I need a Kurta from brand Anouk either yellow or pink in color"



**Query 3: "Please show me some Kurtas combined with Palazzos, I will prefer printed pattern"**

```
generate_response_fashion(query_string3, image_folder)
```

Generated Fashion Assistant Response:

Absolutely! Here are some fabulous options for you:

1. \*\*Khushal K Women Black Ethnic Motifs Printed Kurta with Palazzos & With Dupatta\*\*
2. \*\*max Women Blue Printed Kurti with Palazzos\*\*
3. \*\*Khushal K Women Green & Pink Printed Pure Cotton Kurta with Palazzos & Dupatta\*\*

These pieces perfectly combine Kurtas with Palazzos in vibrant printed patterns. Take a closer look at these stunning ensembles below! ☀️

[Images of the products displayed below]

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**Result 1:**

Product_id	17048614
Name	Khushal K Women Black Ethnic Motifs Printed Kurta with Palazzos & With Dupatta
Product_type	Kurta, Palazzos, Dupatta
Price_INR	5099.0
Colour	Black
Brand	Khushal K
RatingCount	4522.0
Rating	4.4183989385227775
Description	<p>Black printed Kurta with Palazzos with dupatta</p> <p><b>Kurta design:</b></p> <ul style="list-style-type: none"> <li>Ethnic motifs printed</li> <li>Anarkali shape</li> <li>Regular style</li> <li>Mandarin collar, three-quarter regular sleeves</li> <li>Calf length with flared hem</li> <li>Viscose rayon machine weave fabric</li> </ul> <p><b>Palazzos design:</b></p> <ul style="list-style-type: none"> <li>Printed Palazzos</li> <li>Elasticated waistband</li> <li>Slip-on closure</li> </ul> <p>Dupatta Length: 2.43 meters Width: 88 cm The model (height 5'8) is wearing a size S100% Rayon Machine wash</p>
Product_attributes	{'Add-Ons': 'NA', 'Body Shape ID': '443,333,324,424', 'Body or Garment Size': 'Garment Measurements in', 'Bottom Closure': 'Slip-On', 'Bottom Fabric': 'Viscose Rayon', 'Bottom Pattern': 'Printed', 'Bottom Type': 'Palazzos', 'Character': 'NA', 'Dupatta': 'With Dupatta', 'Dupatta Border': 'Solid', 'Dupatta Fabric': 'Viscose Rayon', 'Dupatta Pattern': 'Printed', 'Main Trend': 'Indie Prints', 'Neck': 'Mandarin Collar', 'Number of Pockets': 'NA', 'Occasion': 'Festive', 'Ornamentation': 'NA', 'Pattern Coverage': 'Placement', 'Print or Pattern Type': 'Ethnic Motifs', 'Sleeve Length': 'Three-Quarter Sleeves', 'Sleeve Styling': 'Regular Sleeves', 'Slit Detail': 'NA', 'Stitch': 'Ready to Wear', 'Sustainable': 'Regular', 'Technique': 'Screen', 'Top Design Styling': 'Regular', 'Top Fabric': 'Viscose Rayon', 'Top Hemline': 'Flared', 'Top Length': 'Calf Length', 'Top Pattern': 'Printed', 'Top Shape': 'Anarkali', 'Top Type': 'Kurta', 'Waistband': 'Elasticated', 'Wash Care': 'Machine Wash', 'Weave Pattern': 'Regular', 'Weave Type': 'Machine Weave'}
	

generate_response_fashion(query_string3, image_folder)																					
<b>Result 2:</b>																					
<table border="1"> <tr> <td>Product_id</td><td>19241696</td></tr> <tr> <td>Name</td><td>max Women Blue Printed Kurti with Palazzos</td></tr> <tr> <td>Product_type</td><td>Kurti, Palazzos</td></tr> <tr> <td>Price_INR</td><td>999.0</td></tr> <tr> <td>Colour</td><td>Blue</td></tr> <tr> <td>Brand</td><td>max</td></tr> <tr> <td>RatingCount</td><td>nan</td></tr> <tr> <td>Rating</td><td>nan</td></tr> <tr> <td>Description</td><td> <ul style="list-style-type: none"> <li>• Kurti design: Geometric printed A-line shape V-neck, three-quarter flared sleeves Na pockets Calf length with curved hem</li> <li>• Viscose rayon knitted and woven fabric</li> <li>• Palazzos design: Printed Palazzos Slip-on closure</li> <li>• 100% RAYON Machine washThe model (height 5'8) is wearing a size S</li> </ul> </td></tr> <tr> <td>Product_attributes</td><td>{'Add-Ons': 'NA', 'Body Shape ID': '443,333,324,424', 'Body or Garment Size': 'Garment Measurements in', 'Bottom Closure': 'Slip-On', 'Bottom Fabric': 'Viscose Rayon', 'Bottom Pattern': 'Printed', 'Bottom Type': 'Palazzos', 'Character': 'NA', 'Dupatta': 'NA', 'Dupatta Border': 'Printed', 'Dupatta Fabric': 'NA', 'Dupatta Pattern': 'Solid', 'Main Trend': 'Indie Prints', 'Neck': 'V-Neck', 'Number of Pockets': 'NA', 'Occasion': 'Daily', 'Ornamentation': 'NA', 'Pattern Coverage': 'Large', 'Print or Pattern Type': 'Geometric', 'Sleeve Length': 'Three-Quarter Sleeves', 'Sleeve Styling': 'Flared Sleeve', 'Slit Detail': 'Multiple Slits', 'Stitch': 'Ready to Wear', 'Sustainable': 'Regular', 'Technique': 'NA', 'Top Design Styling': 'Angrakha', 'Top Fabric': 'Viscose Rayon', 'Top Hemline': 'Curved', 'Top Length': 'Calf Length', 'Top Pattern': 'Printed', 'Top Shape': 'A-Line', 'Top Type': 'Kurti', 'Waistband': 'NA', 'Wash Care': 'Machine Wash', 'Weave Pattern': 'Regular', 'Weave Type': 'Knitted and Woven', 'Wedding': 'NA'}</td></tr> </table> 		Product_id	19241696	Name	max Women Blue Printed Kurti with Palazzos	Product_type	Kurti, Palazzos	Price_INR	999.0	Colour	Blue	Brand	max	RatingCount	nan	Rating	nan	Description	<ul style="list-style-type: none"> <li>• Kurti design: Geometric printed A-line shape V-neck, three-quarter flared sleeves Na pockets Calf length with curved hem</li> <li>• Viscose rayon knitted and woven fabric</li> <li>• Palazzos design: Printed Palazzos Slip-on closure</li> <li>• 100% RAYON Machine washThe model (height 5'8) is wearing a size S</li> </ul>	Product_attributes	{'Add-Ons': 'NA', 'Body Shape ID': '443,333,324,424', 'Body or Garment Size': 'Garment Measurements in', 'Bottom Closure': 'Slip-On', 'Bottom Fabric': 'Viscose Rayon', 'Bottom Pattern': 'Printed', 'Bottom Type': 'Palazzos', 'Character': 'NA', 'Dupatta': 'NA', 'Dupatta Border': 'Printed', 'Dupatta Fabric': 'NA', 'Dupatta Pattern': 'Solid', 'Main Trend': 'Indie Prints', 'Neck': 'V-Neck', 'Number of Pockets': 'NA', 'Occasion': 'Daily', 'Ornamentation': 'NA', 'Pattern Coverage': 'Large', 'Print or Pattern Type': 'Geometric', 'Sleeve Length': 'Three-Quarter Sleeves', 'Sleeve Styling': 'Flared Sleeve', 'Slit Detail': 'Multiple Slits', 'Stitch': 'Ready to Wear', 'Sustainable': 'Regular', 'Technique': 'NA', 'Top Design Styling': 'Angrakha', 'Top Fabric': 'Viscose Rayon', 'Top Hemline': 'Curved', 'Top Length': 'Calf Length', 'Top Pattern': 'Printed', 'Top Shape': 'A-Line', 'Top Type': 'Kurti', 'Waistband': 'NA', 'Wash Care': 'Machine Wash', 'Weave Pattern': 'Regular', 'Weave Type': 'Knitted and Woven', 'Wedding': 'NA'}
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## **Summary:**

We notice that results obtained from Search Layer and Generative Layer are exactly the same. Generative Layer adds the conversational response to the existing Search capabilities.

While the search layer provides relevant results based on keyword matching or other predefined criteria, the generation layer leverages advanced AI models like GPT-3.5 to generate responses dynamically, incorporating context and generating detailed information tailored to the query.

## **Challenges faced:**

Faced few challenges with LlamaIndex libraries so had to adopt alternative approaches:

1. While implementing FAISS Caching saw an error: `ModuleNotFoundError: No module named 'llama_index.vector_stores.faiss'`, as result had to stick to `DiskCache`.
2. Tried to implement caching using `LLMReranker` but faced issues `ImportError: cannot import name 'LLMReranker' from 'llama_index.core.postprocessor'`. Used sentence-transformers for re-ranking then embedding: **all-MiniLM-L6-v2**.