Clothing Recommendation System

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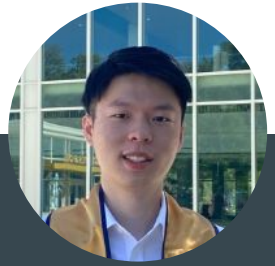

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Problem Overview

How often have we stood in front of our wardrobes completely confused about what to wear? Matching this shirt with these pants or this jacket, it's often overwhelming and exhausting.

Solution Overview

We aim to rectify this problem by designing a recommendation system to inform the user what his best options are given the clothes they have. The user enters the clothes available or just takes a picture to begin. The model, trained using images in fashion articles or websites, finds the best combination from those clothes and returns it thereby saving the user endless headaches and time.

Datasets

Deep Fashion	Deep Fashion 2
800K diverse images of 50 popular clothing categories Contains 300K commercial-consumer clothing pairs Has 1000 descriptive attributes, bounding box and clothing landmarks for each clothing article ranging across well-posed shop images to low-quality consumer images	491K diverse images of 13 popular clothing categories Contains 873K commercial-consumer clothing pairs Has 801K clothing items, where each item in an image is labeled with scale, occlusion, zoom-in, viewpoint, category, style, bounding box, dense landmarks and per-pixel mask

We chose DeepFashion2 over DeepFashion because it has a more manageable size. It also has more cross-pairings making it more suitable for recommendations.

DeepFashion2 Structure

JSON


```
{
   "item2":{
      "segmentation":[ ],
      "scale":2,
      "viewpoint":2,
      "zoom_in":1,
      "landmarks":[ ],
      "style":0,
      "bounding_box":[ ],
      "category_id":1,
      "occlusion":1,
      "category_name":"short sleeve top"
   },
   "source":"shop",
   "pair_id":31,
   "item1":{
      "segmentation":[ ],
      "scale":1,
      "viewpoint":2,
      "zoom_in":1,
      "landmarks":[ ],
      "style":4,
      "bounding_box":[ ],
      "category_id":7,
      "occlusion":2,
      "category_name":"shorts"
   }
}
```

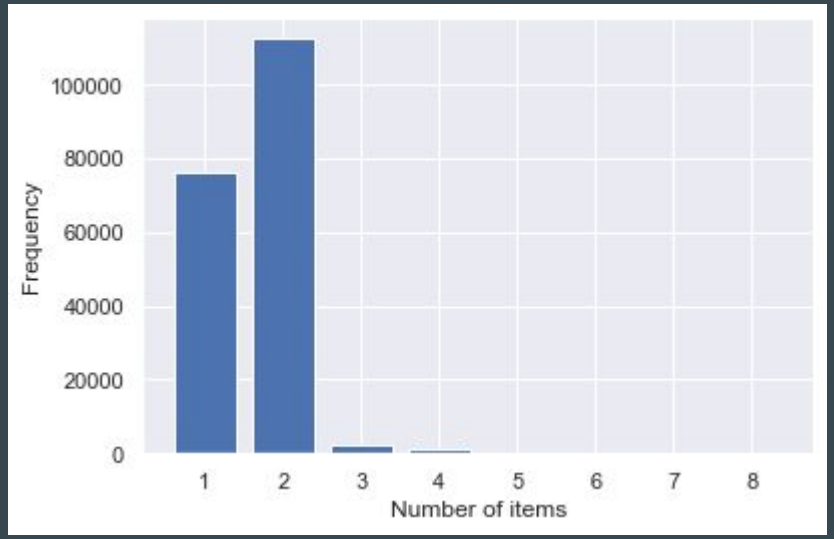

Image

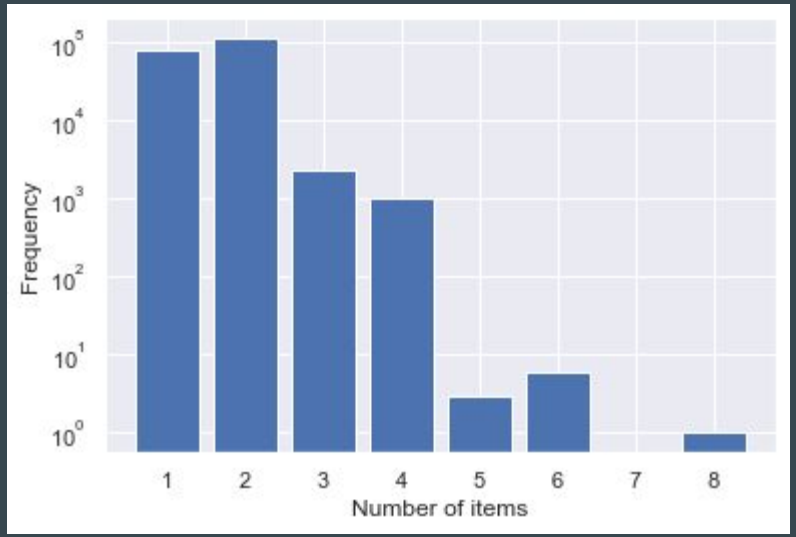
Our dataset had a very clean and structured JSON format.
We employ a sampling method of using single article images for classification and using multi article images for building the collaborative filtering matrix.

Key Steps

Data Access	• Access and download datasets • Preprocess, clean up and sample data
Data Visualization	• Exploratory analysis on the dataset labels • Research techniques for image data analysis
Clothing Identification	• Classify type of clothing article • Build method to find colour of clothing article
Recommendations	• Construct similarity matrix for recommender • Identify and recommend on test clothing article

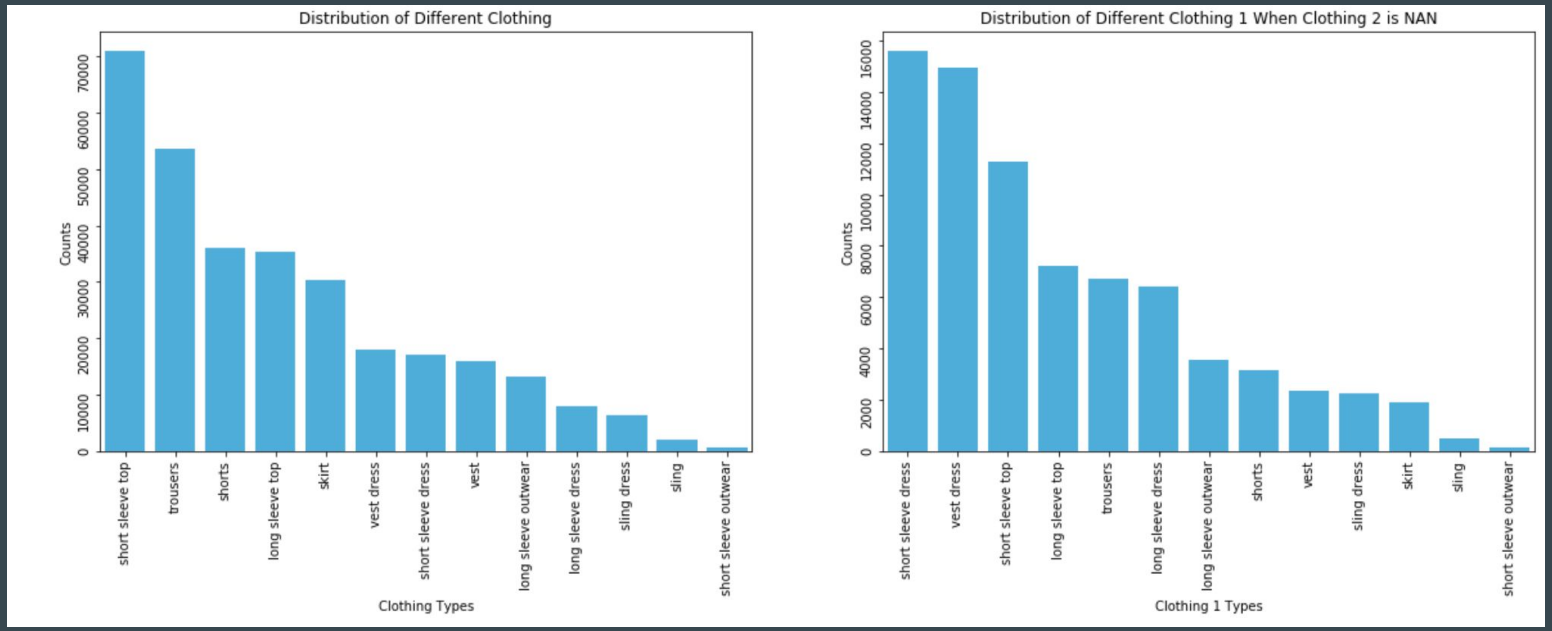
Number of Images by Number of Items





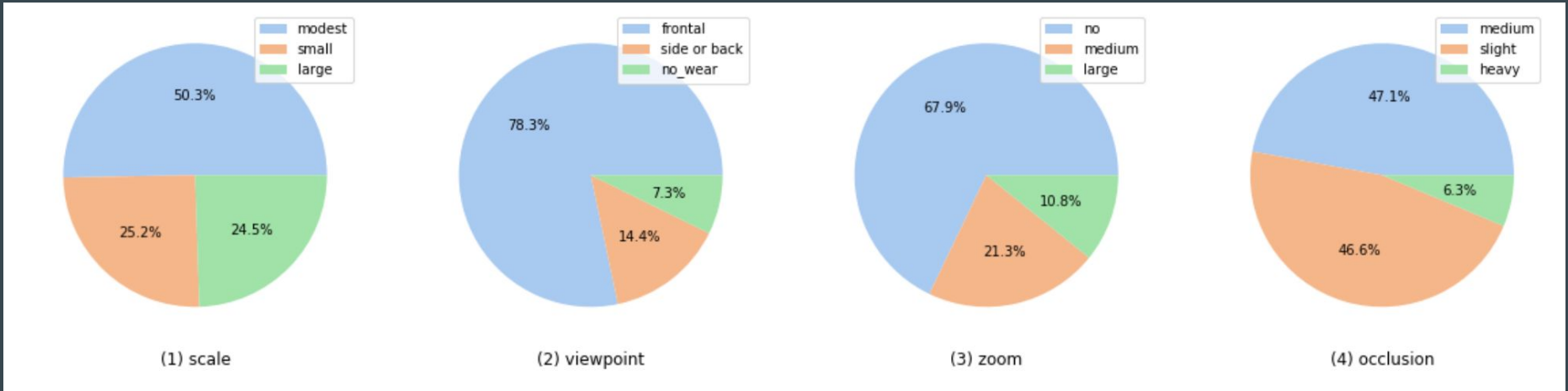
We plotted the distribution on the normal scale but it had highly different scales.
We then adjusted the graph to plot the frequency on log scale to have a better visualization.

Distribution of Clothing Types



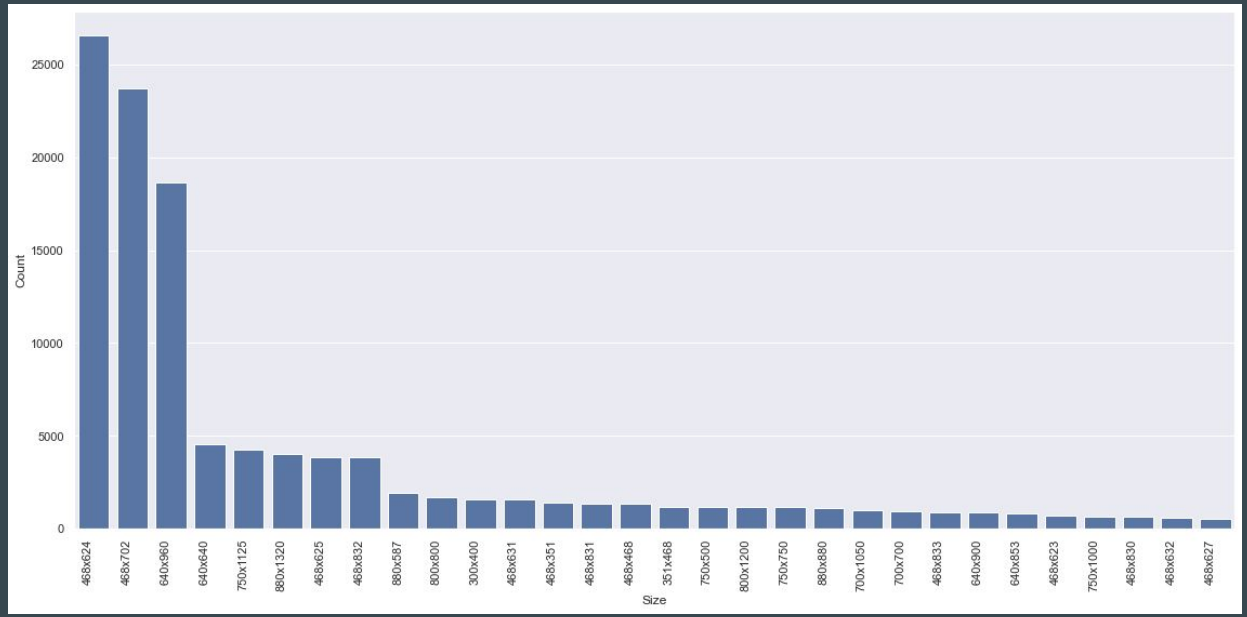
Short sleeve tops are the most frequent overall.
Short sleeve dress is the most frequent when the image has just one article.

Distribution of Image Features



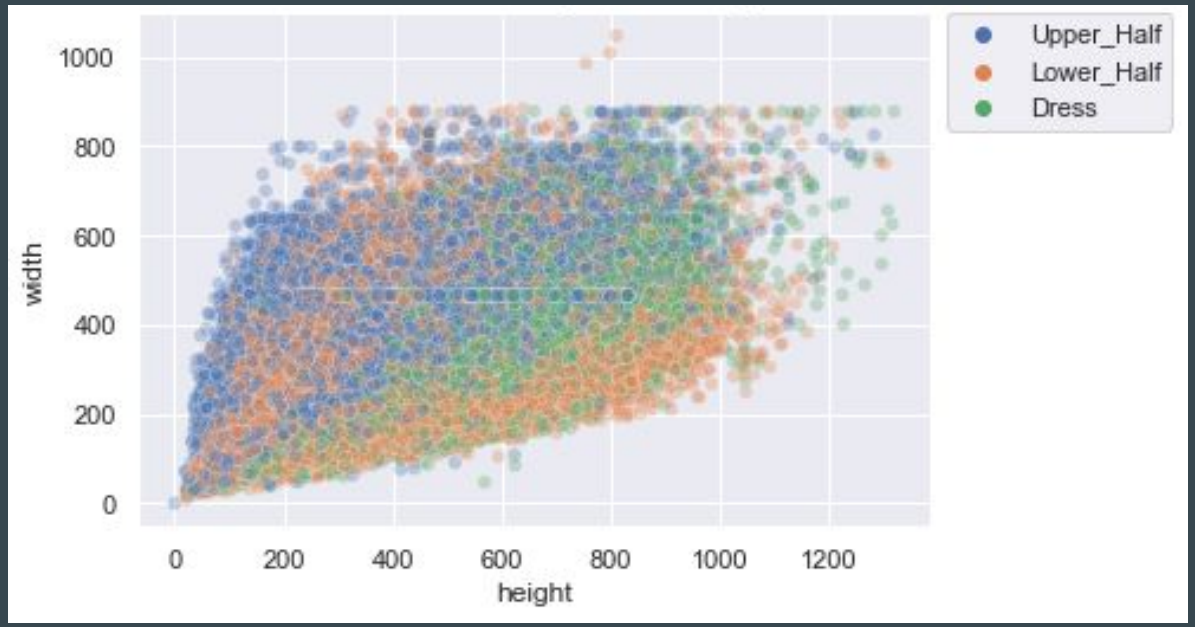
Most items are in modest scale, frontal viewpoint, and no zoom
Most items have medium or slight occlusion

Number of Images by Size



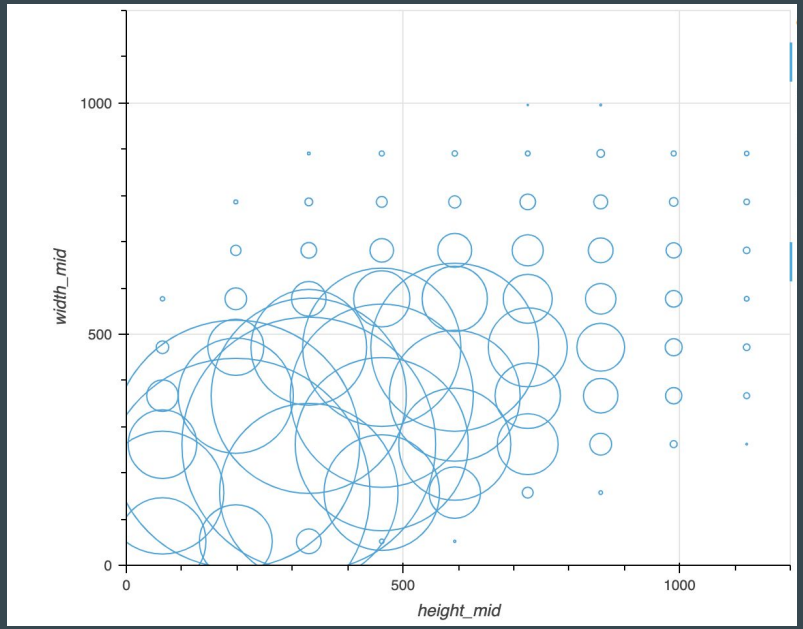
Most images have the proportion - 468*624.
The majority have shorter width and larger height.

Width vs Height for Bounding Boxes by Categories



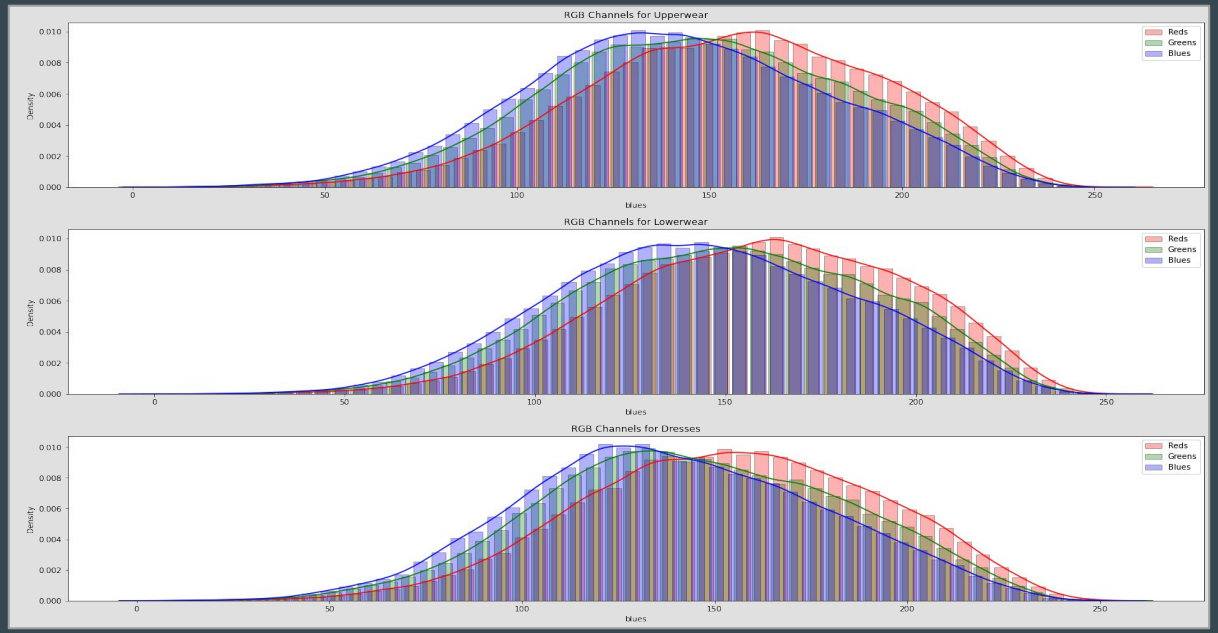
Dress has greater heights than widths. This is expected as they generally have a long shape.
Upper Half has greater widths than heights. This is expected as they generally have sleeves.

Number of Images by Bounding Box Shape



The larger circles are along the diagonal. This indicates that most of the boxes are squares. Looking at the density, we can see that most boxes have dimensions less than 500 pixels.

RGB Channels Across Clothing Categories



Distribution of the three color channels is identical between the three categories.
Warmer (redder) colors are more dominant than cooler (bluer) ones.

Machine Learning Techniques

Image Classification

Convolutional Neural Networks
Transfer Learning

Recommendation Engine

Collaborative Filtering

Thank You