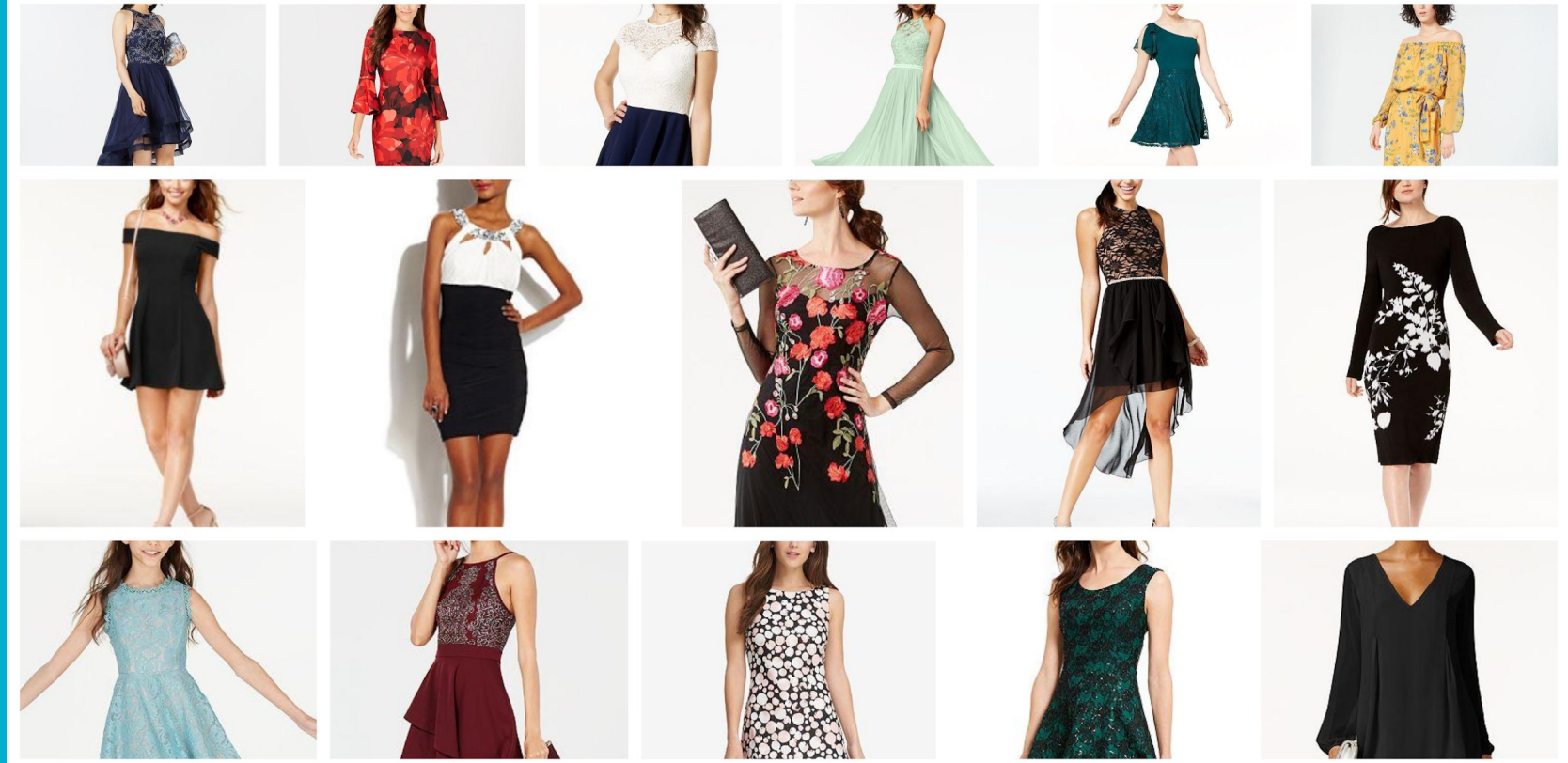
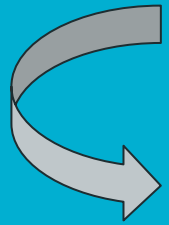


SIMILAR DRESS SELECTION

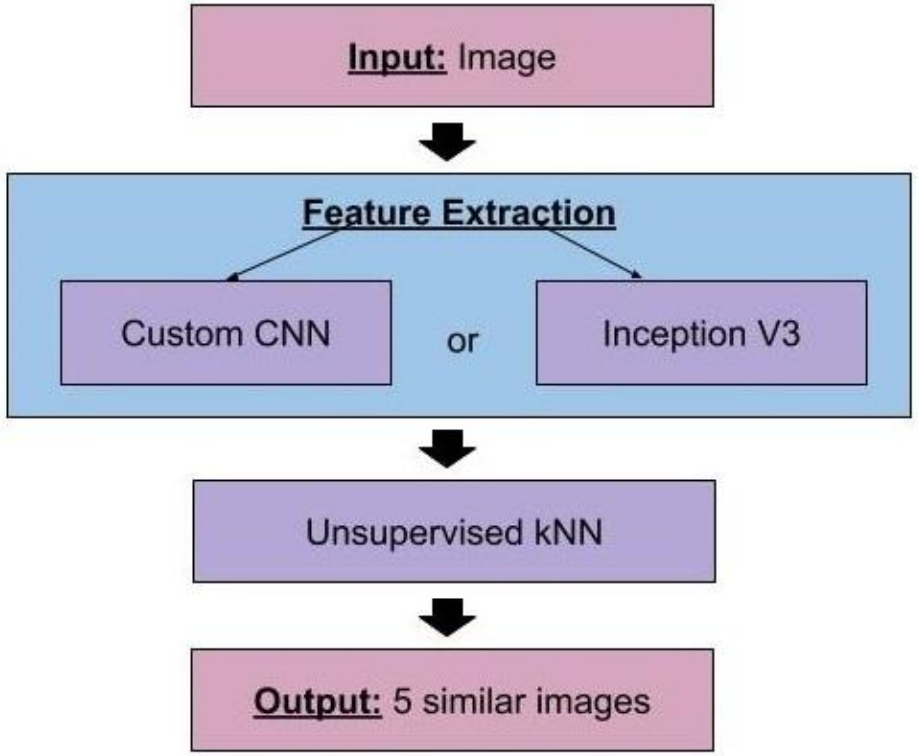
Problem Outline

- Online shopping is a new reality
- Spending lots of time to select dresses to buy
- Impossible just to look at nearby hanging ones
- No online shopping consultant (like store representative)
- Selected desired dress is too expensive, does not have needed size, etc.



SOLUTION: Similar Dress Selection Tool

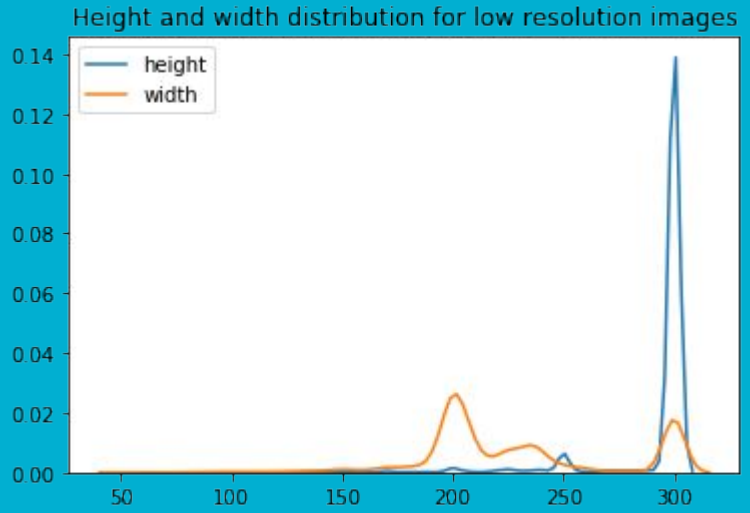
Solution Outline



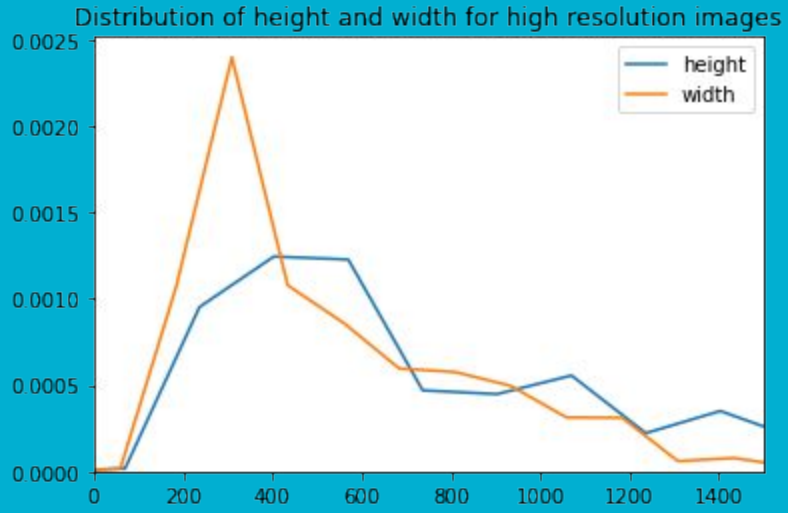
Data Acquisition

- For training custom CNN:
  - Deep Fashion dataset: over 200,000 images in 42 clothing categories with 1000 attribute labels
    - Low resolution images
    - High resolution images
  - Select dress images only and relevant attributes (61, 414 images with 38 attributes)
  - Train-validation-test split
- For testing:
  - Test part from Deep Fashion Dresses of 11,651 images
  - Small unlabeled testing set of 101 images scrapped from Google
  - Large unlabeled testing set of over 8,000 images from data.world

Image Size Selection for Training



Selected size: 300x200 pixels



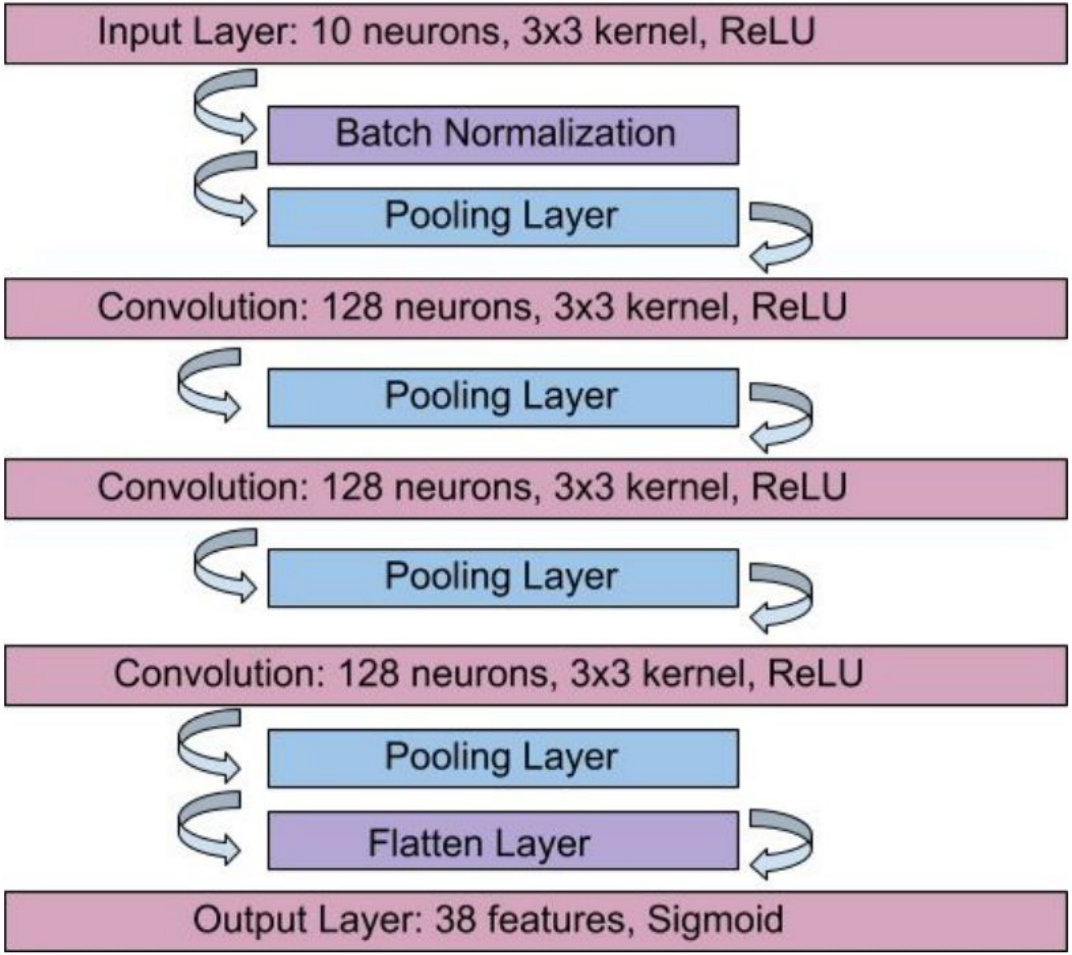
Selected size: 450x300 pixels

CNN Building and Exploration

Experiments with low resolution images to build custom CNN and explore it:

- Gradually adding hidden convolutional layers
- Changing layer parameters:
  - Kernel size (3x3 and 5x5)
  - Number of neurons in hidden layers (128 and 256)
  - Activation function (ReLU and Leaky ReLU)
- Adding extra hidden Dense layers

Final CNN for Feature Extraction



Feature Extraction

- For:
  - Test part of Deep Fashion dresses subset
  - 101 Google dress images
  - Large test set from data.world

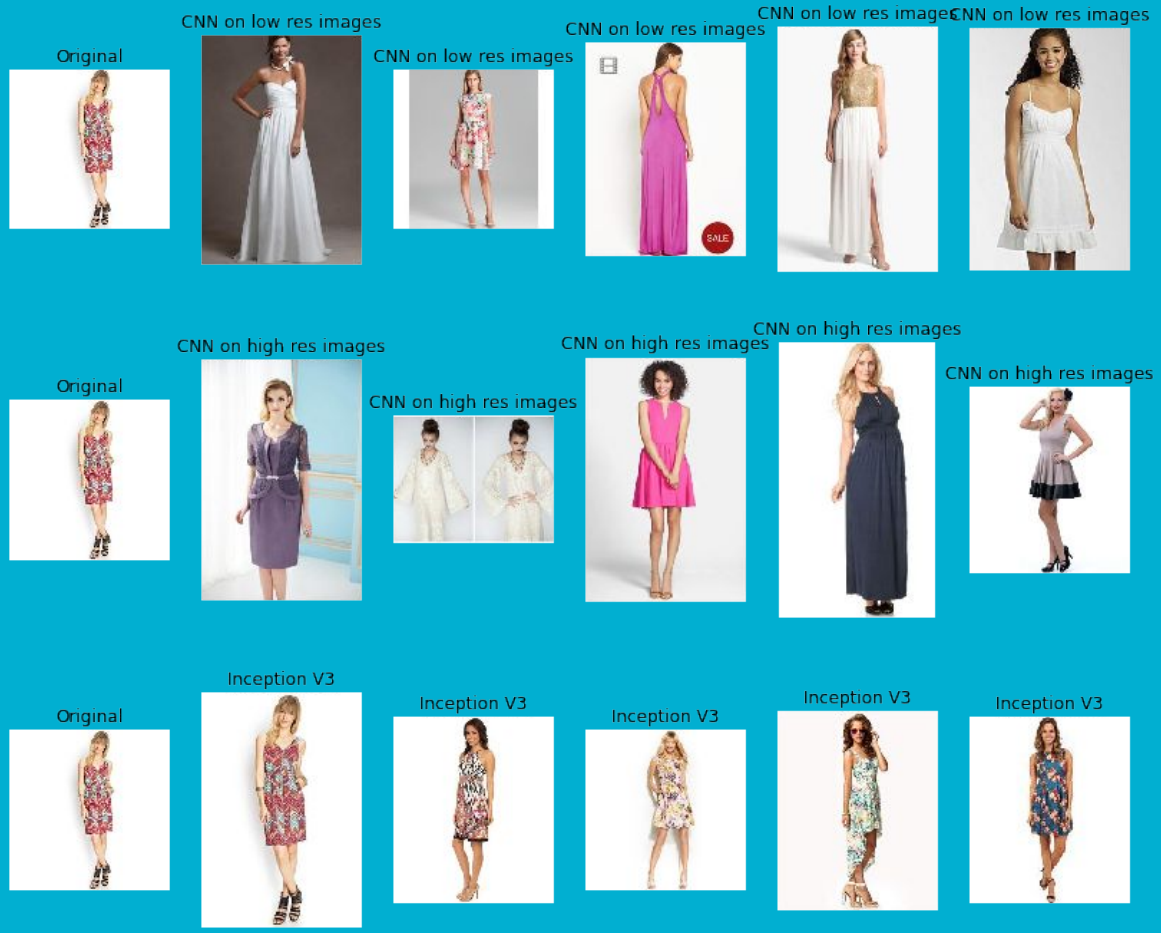
- From:
  - CNN trained on low resolution images
  - CNN trained on high resolution images (same structure)
  - Inception V3 - pre-trained computer vision model with ImageNet weights

Unsupervised k Nearest Neighbors

- Input:
  - set of extracted features from neural networks
- Process:
  - groups items by vector distances
- Output:
  - specified number of closest images

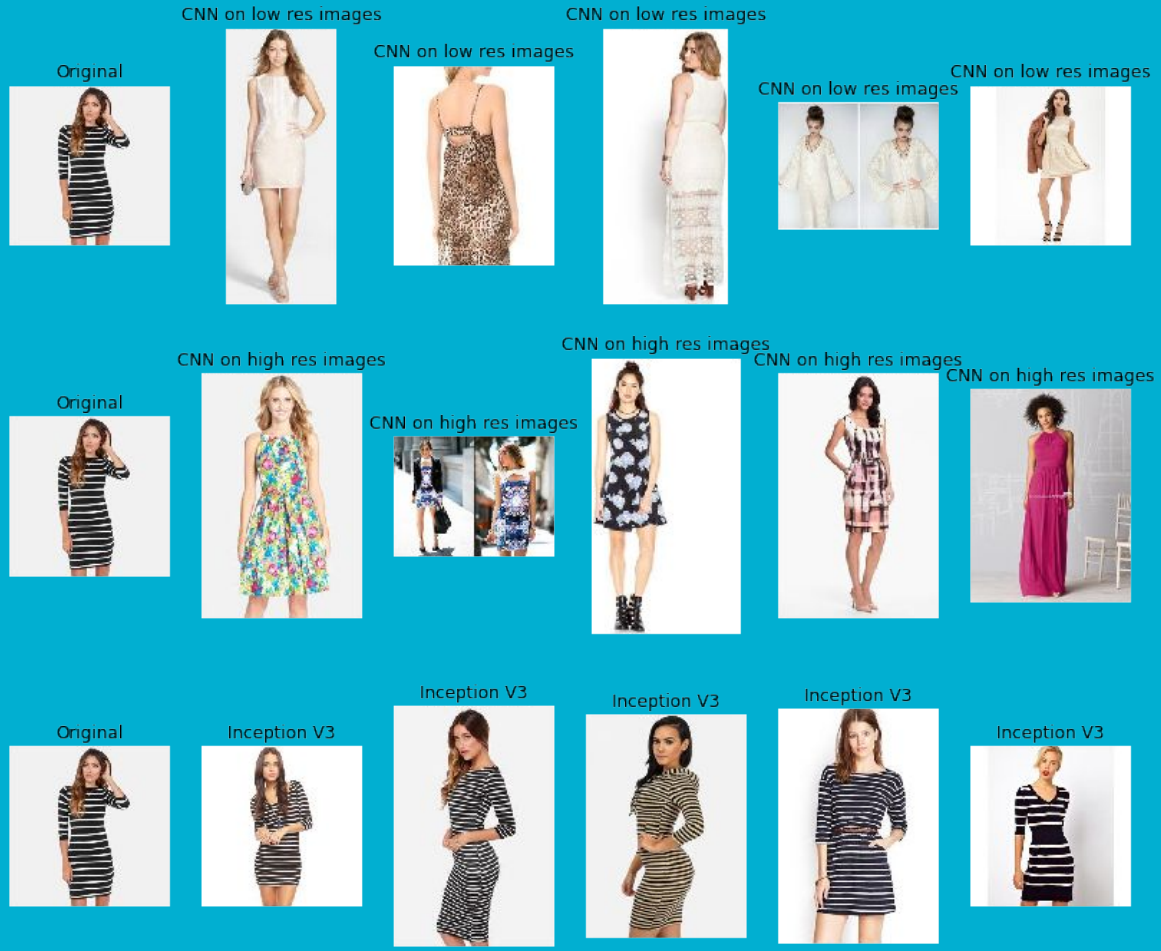
Test Results

- From test part of Deep Fashion Dresses
- Inception V3 feature selection provides the best results
- Even finds the exact same image - not accomplished by other models



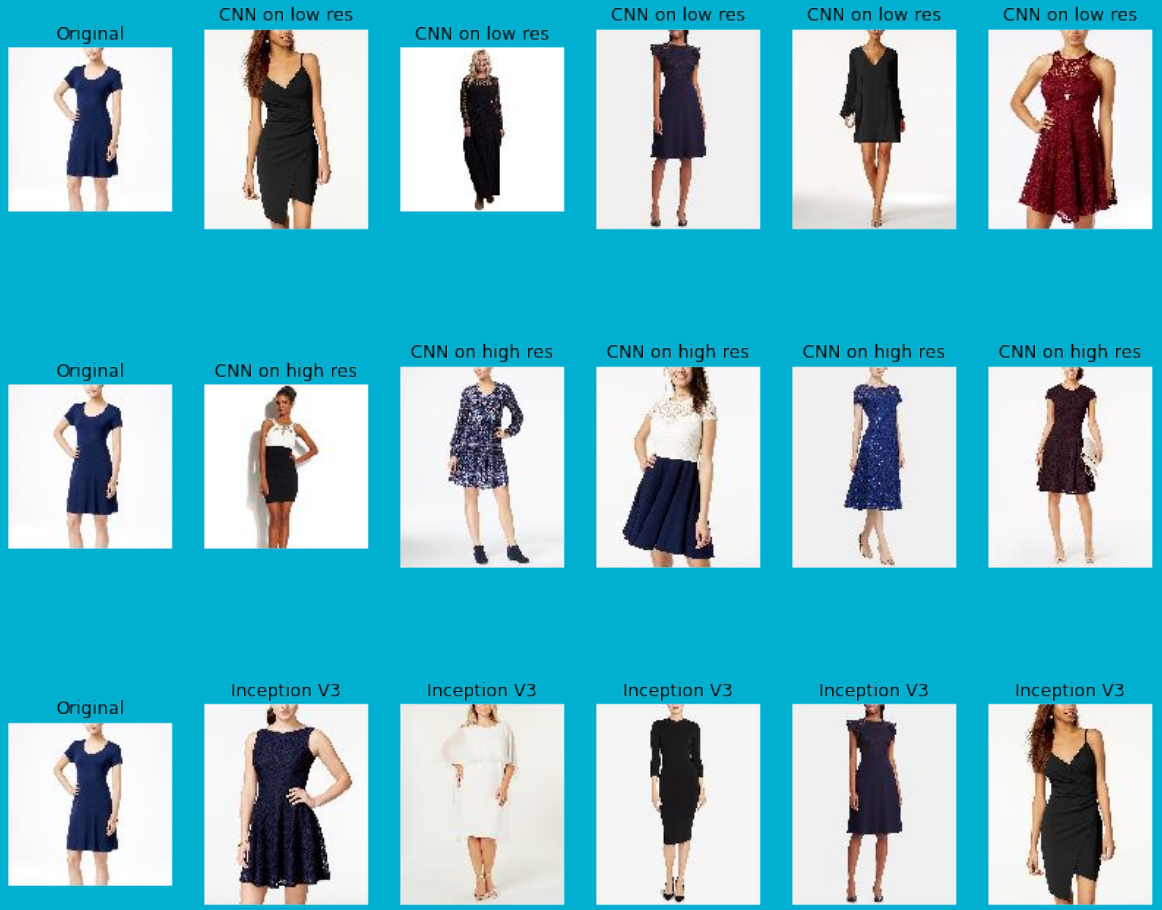
Test Results

- From test part of Deep Fashion Dresses
- All stripes from Inception V3 selected features



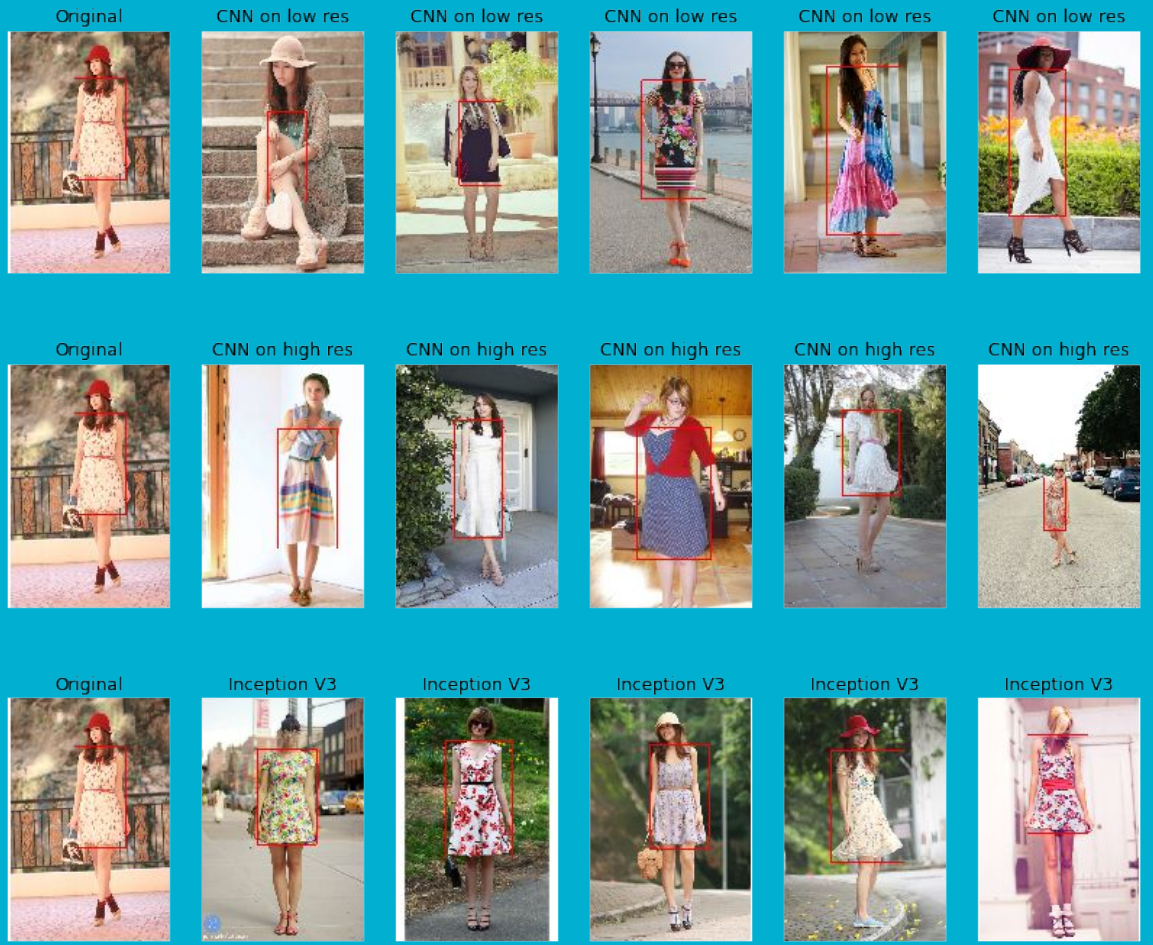
Test Results

- From 101 Google dress images
- All models provide acceptable results
- Small amount of images = not enough really similar looking ones



Test Results

- From large unlabeled test set
- Inception V3 captures dress characteristics better:
  - Floral pattern
  - Midi length
  - Fit and flare style
- Other models select some similar items



Ways to Improve Outcome

- Experiments with features from Inception V3
- Changing grouping algorithm (Ball Tree, KD Tree, Brute) - no changes in results
- Changing number of leaves (10, 20, 30, 40) - no changes in results
- Changing metric for distance calculation (Minkowski with p=2 (same as Euclidean), with p=3, Manhattan and Chebyshev)
    - Slight result differences, but no actual improvement - Euclidean distance is default