



Search My Favorites by Color: Fashion Parsing through Color Classification

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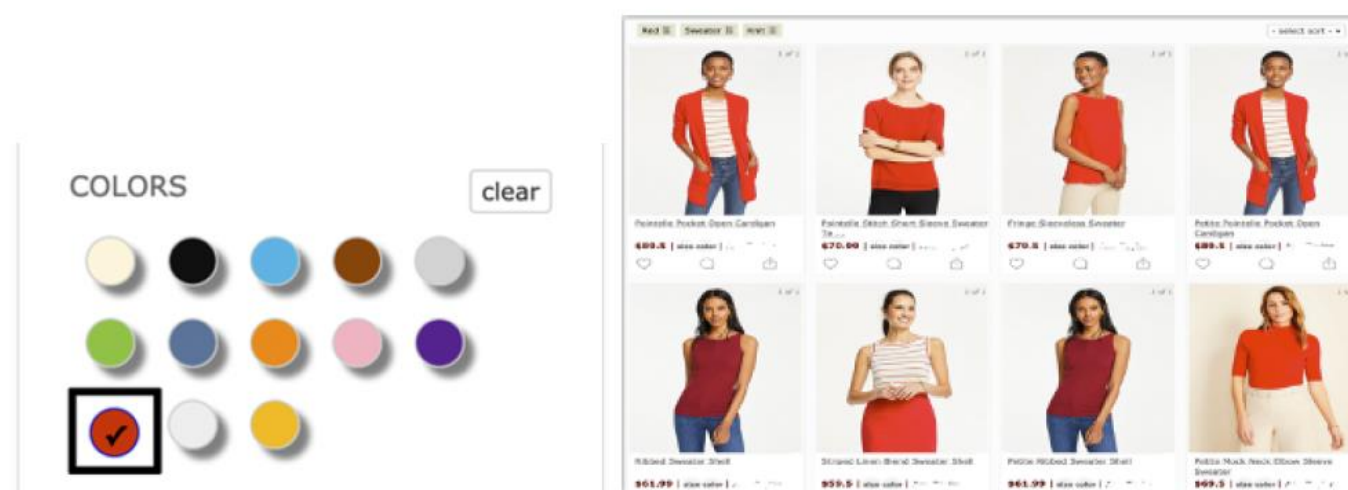
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<https://youtu.be/a3zaOZ5n-KM>

Introduction

Proposed a deep learning approach to learn the color of fashion images. Understanding the color of fashion images can allow customers filtering their favorite cloth based on a selected color. For example, when a customer searches a sweater, and then want to filter by 'Red' sweater, our backend deep learning service will have all the sweaters in the "Red" category showing back to customers.

- Existing solutions all using **linguistic HTML tag** instead of digital analyzing of the image itself
- The **first experiment** using convolutional neural network to classify **color of objects** instead of **types of objects**



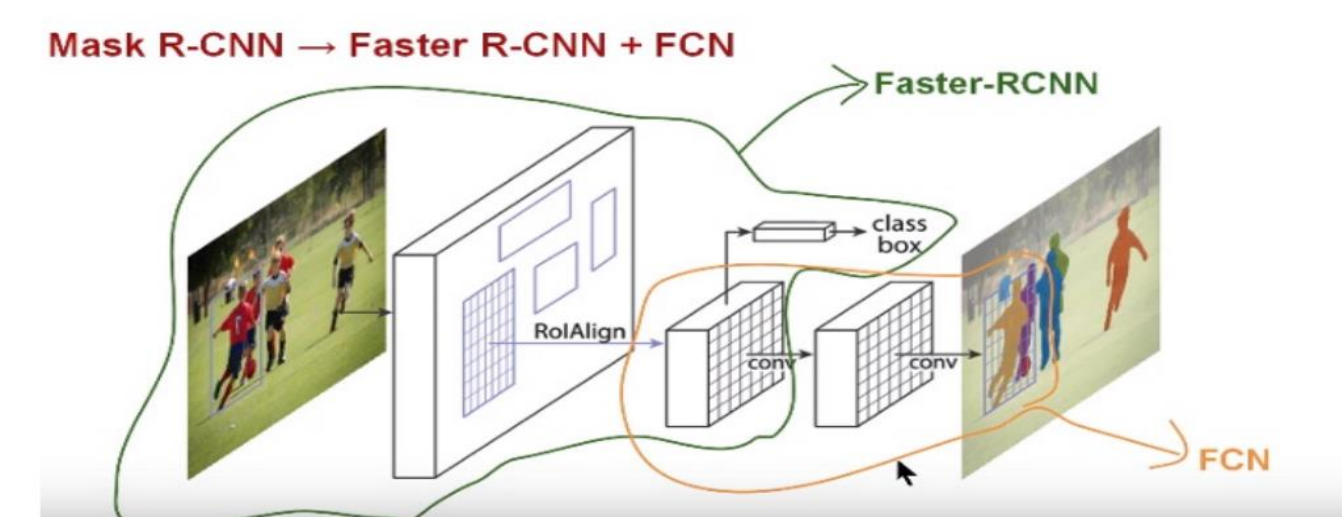
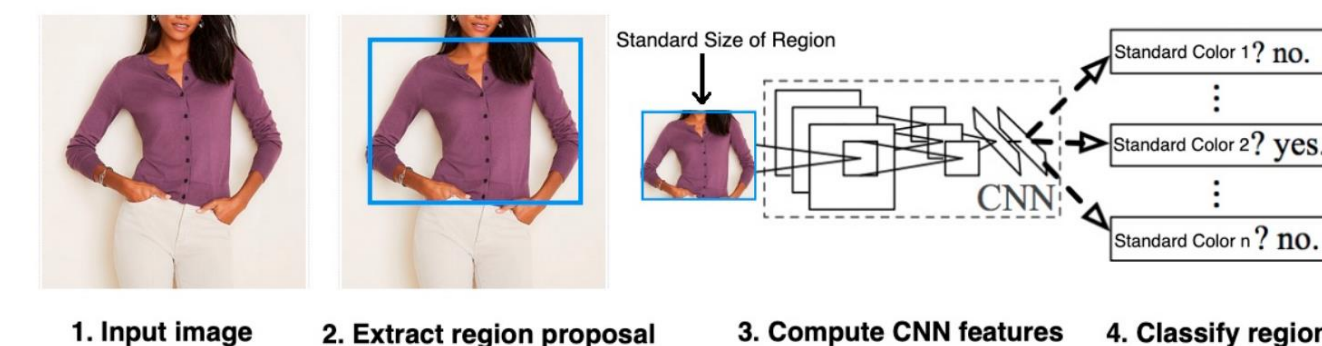
Dataset

- Fashion-MNIST is one of the most popular dataset for fashion deep learning, but it does not apply to this project as all are grey-scale images
- DeepFashion dataset is more suitable for us on such Color-Labeling project
- We use images its "In-shop Clothes Retrieval Benchmark" as our training dataset

Preprocessing

- Defined 10 standardized color name convention. Manually labelled all images in training dataset with one of those 10 categories of color
- Use LabelMe tool to mark boundary annotation for each image for instance segmentation training
- Transform the output of LabelMe to COCO dataset format for ease of training data input

Methods



- Since we only interested in the color of the cloth which is a region of interest (ROI) in the picture, we start the idea of Region-based convolutional neural network (R-CNN) architecture to train the data
- Adopted the advanced version of R-CNN, Faster R-CNN, to generate the feature mapping. It uses a single CNN to both carry out region proposals and classification
- To more align with cloth boundary in fashion image, we utilized the lasted technique, Mask R-CNN, to provide pixel level segmentation and object detection. Mask R-CNN combines the two networks — Faster R-CNN and FCN in one mega architecture.
- We leverage Detectron2 implementation and use its API with model-zoo package to train and predict our data.

Experimental Results



We generated around 200 images with COCO format boundary annotation as training dataset input and training with 450 iterations. We can see Mask R-CNN approach gives a very satisfied boundary detection of the cloth and satisfied color detection for both pure and non-pure color cloth.

- Almost all of the pure color fashion images output the correct color predictions with high confidence of probability
- For non-pure color clothes. All gives corrected/make sense colors based on the background or highlighted colors. Except for black color, all gives a high confidence of probability
- Still a few cases which need improvement, such as multi-color detected, wrong boundary, weird color prediction. Most of them can be improved by giving a consistent labeling in training dataset

Analysis

- Except for black color, all colors return an average confidence probability of above 70 percentage and give more than 85% of average accuracy of color prediction.
- Some inaccurate prediction could be caused by inconsistent labeling of such color in training set
- We may paradoxically label purple, blue or navy at different examples, causing the training model is confused. We will consider making a more consistent and standardized labeling of deep colors in our training set to improve the prediction of black color

Color List		
color	confidence probability	accuracy
Black	51%	77%
Blue	91%	100%
Green	85%	94%
Magenta	71%	85%
Navy	73%	86%
Pink	94%	100%
Purple	89%	92%
Red	92%	100%
White	88%	99%
Yellow	88%	98%

Conclusion

- We presented an approach of color prediction for fashion images using the Mask R-CNN technique
- All previous classification works through convolutional neural network (CNN) are focused on types of objects instead of color classification
- The implementation and experimental results showing satisfied and expected outcomes

Future works

- We will be more cautious on color labelling in future to give a consistent name convention for each color with high quality training dataset
- Investigate the best hyper-parameters, weights and iteration loops for different sizes of training set to achieve the optimized performances