Afronet: Shopping Afrowear from Anywhere
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Motivation
The African clothing industry is a $20 Billion market, largely overlooked by American retailers [1]. The industry presently benefits from strong tailwinds and consumers have greater buying power than ever before.

The Status Quo is Frustrating

Figure 1. A typical afrowear retail experience.

Our Solution

Figure 2. High-level diagram showing our model’s input and outputs.

Dataset
We scraped African shopping websites for over 15K images of labelled afrowear with 14 different categories.

Semi-hard switching triplets
38K+ triplets that violate the margin constraint. Theses negatives were generated using Photoshop scripts.

Hard negatives category triplet
60K+ triplets of different categories that violate the triplet constraint.

Model

![Diagram of model architecture]

Figure 3. Sample semi-hard switch triplets

Metrics

Color Histogram Correlation

\[ d(B_i, B_j) = \frac{\sum_{k=1}^{N}(B_i(k) - B_j(k))^2}{\sum_{k=1}^{N}(B_i(k))^2 \sum_{k=1}^{N}(B_j(k))^2} \]

Mean Average Precision

For our accuracy metric, we used Mean Average Precision on rank n to evaluate our model [4].

\[ \text{MAP}(p, n) = \frac{1}{n} \sum_{i=1}^{n} \frac{\text{precision}(i)}{i} \]

Results

Figure 5. Graphs of training data. We used a constant margin since a threshold- based margin every epoch would have, at best, improved just the convergence rate to of the margin to around 1.5.

Table 1. Table of results from experiments.

<table>
<thead>
<tr>
<th>Model</th>
<th>Train MAP</th>
<th>Test MAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1</td>
<td>0.779</td>
<td>0.579</td>
</tr>
<tr>
<td>Model 2</td>
<td>1.25</td>
<td>1.25</td>
</tr>
<tr>
<td>Model 3</td>
<td>1.29</td>
<td>1.29</td>
</tr>
</tbody>
</table>

Discussion

Expectations: Our model performed slightly better than the baseline as it was able to learn that the background should be ignored.

Impact of Background: We cropped as much of the background as possible, however, the distracting background colors still negatively affected our similarity metrics.

Measuring Style: Cropping to the center of images helped improve our test accuracy for color using histogram correlation between the query and output images.

Margin Size: Setting a higher margin generally led to better results in training. But margins greater than 2.0, there was no significant impact on the margin after it converged.

Sample Outputs

Figure 7. Sample outputs from baselines and Model 1

Future Work

Learning Margins: Updating margins from backpropagating loss.

Training on More Data: Gathering more non-stock data and extending the dataset to include more categories.

Exploring Similarity Metrics: Categorizing data using attribute semantics.

References

[1] Nor Adebowale, Why the world should invest in African fashion. 2014.
[5] (on Images from Noun Project (Sian Khiong-Lay, Mateo Zleta).}