Latent Factors of Visual Popularity Prediction

**METHOD**
- Pairwise ranking SVM, where \( y_i \) is the popularity of image \( i \)
- Margin, \( \Delta(y_i, y_j) \), can vary based on popularity difference
- Introduce latent senses to capture nuances in popularity

\[
\begin{align*}
L_{\text{exp}} &= \sum_i \sum_j \left( \Delta(y_i, y_j) - f_i(x_i) + f_j(x_j) \right)_+ \\
&\quad \forall i, j \text{ s.t. } y_i > y_j \\
&\quad f_i(x) = \max_{k \in X} w_k^i x
\end{align*}
\]

**EXAMPLES OF POPULAR LATENT SENSES**

**EXAMPLES OF UNPOPULAR LATENT SENSES**

**UNPOPULAR LATENT SENSES**
- What makes an image unpopular is also informative
- Introduce set of parallel, negative latent senses

\[
L_{\text{exp}} = \sum_i \sum_j \left( \Delta(y_i, y_j) - f_i(x_i) + f_j(x_j) \right)_+ + \Delta(y_i, y_j) - f_i(x_i) + f_j(x_j)_- \\
\text{[popular senses]} + \text{[unpopular senses]}
\]

- Popularity and unpopularity learned independently at train time
- Single popularity score calculated at test time:

\[
f_{\text{pop}}(x) = \max_{k \in X} w_k^p x - \max_{k \in X} w_k^u x
\]

**MBI-1M DATASET**
- New, challenging dataset of 1 million images from social media
- Twitter posts containing images from TREC 2013 Microblog track
- Retweet and Favorite counts for popularity prediction research
- Many graphical, non-photographic images

**CONCLUSIONS**
- Latent ranking approach gives further insight and predictive ability
- Considering what makes images unpopular is important
- New, challenging dataset based on images from microblogs