GeoStyle: Discovering Fashion Trends and Events

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Contributions

- Detecting and predicting fashion trends over space and time
- A fully-automated framework for fashion trend discovery.
- Accurately model and forecast long-term trends, like seasonal cycles.
- Discover and group short-term spikes caused by events, like rallies, festivals and sporting events.
- Automatically discover the reasons for these events.

Stage I - Recognition

- Classify attributes from StreetStyle\textsuperscript{1}.
- Aggregate probability values at each time & city.

Stage II - Characterizing Trends

- Interpretable, expressive parametric model capturing linear and cyclical trends.

\[ f(t) = (1 - r) \cdot L(t) + r \cdot C(t) \]

\[ L(t) = m_{\text{lin}} \cdot t + c_{\text{lin}} \]

\[ C(t) = m_{\text{cyc}} \cdot \text{sin}(w \cdot t + \phi) - k \]

\textbf{Parameter} \quad \textbf{Interpretable meaning}

- \( r \): Trade-off between linear and cyclic trend
- \( m_{\text{lin}} \): Rate of long-term change in popularity
- \( m_{\text{cyc}} \): Amplitude and sign of cyclical spikes
- \( k \): Spikiness of cyclical spikes

Stage III - Discovering Events

- Find outliers using hypothesis testing framework.
- Group outliers based on proximity and periodicity.

Stage IV - Mining Reasons for Events

- Use TF-IDF on captions to identify words most representative of an event.

Pipeline

1 SNE of dataset images

Attribute Recognition & Style Discovery

Stage I - Recognition

44 cities

3 years (June 2013-May 2016)

7.7 million images

Instagram+Flickr\textsuperscript{100m}

Stage II - Characterizing Trends

Stage III - Discovering Events

Stage IV - Mining Reasons for Events

100% of the top 35 events are explainable by captions.

Popular events around the world using representative styles

Styles are discovered by clustering in embedding space\textsuperscript{1}.

A fully-automated framework for fashion trend discovery.

Models trends using prior understanding results in more accurate and interpretable forecasting models.

20% improvement in prediction error rate v/s VAR.

A total of 725 events discovered of which 456 are interpretable as seasonal sporting events, festivals or political rallies.

Text combined with visual features helps in explaining events.

References


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Future Work

- Extending the method for other domains and datasets.
- Analysis at a fine-grained level.
- Looking at methods to alleviate bias due to dataset.

Take-away

- Accurate, fine-grained prediction of trends

- Discovers new events unknown to the authors

- "Catalan way" 2013 Sep in Barcelona

Results

Due to space limitations, we refer the reader to the full version of this paper for more details.