

A Multimodality Approach to Predicting the Popularity of Sneakers

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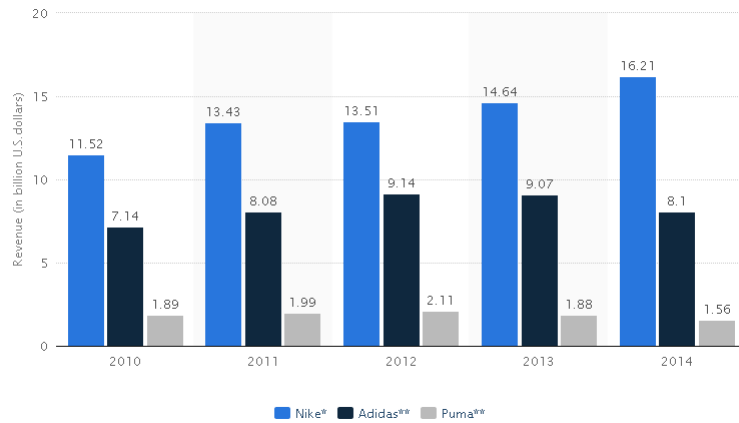
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Intelligent fashion analysis



Revenue from footwear segment (in billion U.S. dollars)



source: <http://www.statista.com/>

Sneaker design



Predicting the popularity of sneakers

- Objective
 - Rate a sneaker in terms of popularity
- Applications
 - Fashion analysis
 - Product search: relevance and quality
 - Product recommendation

solecollector.com

The screenshot displays the 'Sneaker Release Dates' page on solecollector.com. The page features a navigation bar with 'LOGIN / SIGN UP', 'SOLE COLLECTOR', 'NEWS', 'RELEASE DATES', 'FORUMS', and 'MARKETPLACE'. The main content area is titled 'Sneaker Release Dates' and shows a list of sneakers. The first sneaker is the 'Jordan Flight Runner Black/Infrared 23-Dark Concord', which is highlighted with a blue box. Below it is the 'Nike Sonic Flight Black/Purple Venom-White-Tour Yellow', also highlighted with a blue box. The page includes a sidebar with 'Recent Videos' and 'OUR PICKS'.

Jordan Flight Runner Black/Infrared 23-Dark Concord
 COP 20% NOT 80% + FOLLOW
 MAY 1ST PRICE: \$110.00
 Introducing the Jordan Flight Runner. This is the first young shoe from Jordan Brand. They come in a black, infrared 23 and dark concord colorway. Featuring a black based upper with infrared 23 and concord purple accents sitting on a white sole. A general release, look out for these at select Jordan Brand accounts worldwide in early May 2014. Retail is set at: \$110.
 Style Code: 631606-053

Nike Sonic Flight Black/Purple Venom-White-Tour Yellow
 COP 36% NOT 64% + FOLLOW
 MAY 1ST PRICE: \$140.00
 This Nike Sonic Flight is known as the "Lakers" edition, inspired by the time Gary Payton spent playing in Los Angeles. They come in a black, purple venom, white and tour yellow colorway, featuring a black based upper with purple, white and yellow accents. A general release, look out for these at select Nike accounts worldwide in early May of 2014. Retail is set at: \$140.
 Style Code: 641333-001

Dataset

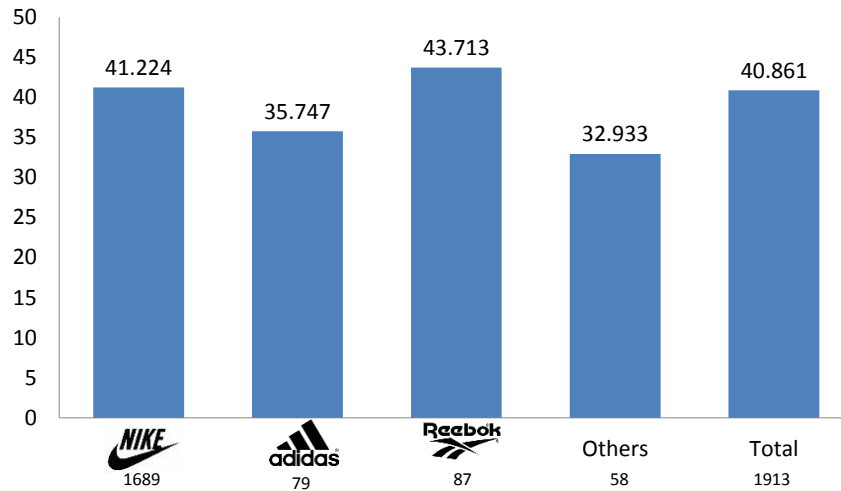
- Collected from solecollector.com
- 1913 products released from December 2010 to October 2013
- Population data (no sampling)



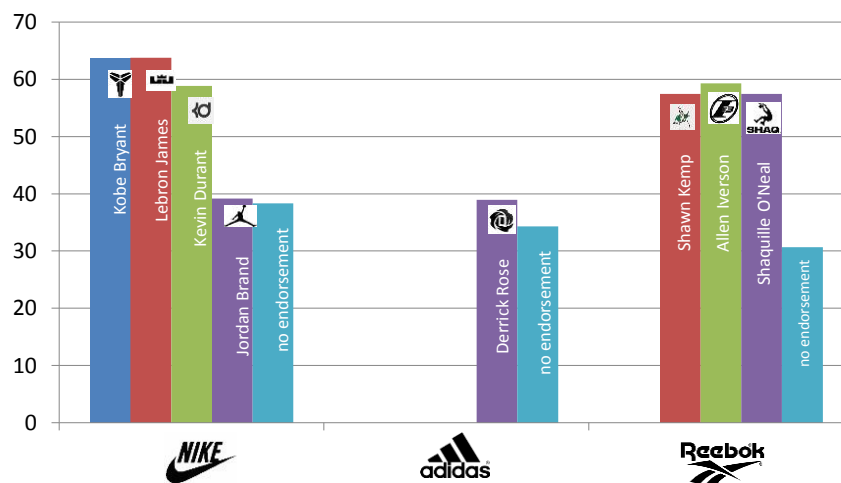
Sneaker design vs. COP score



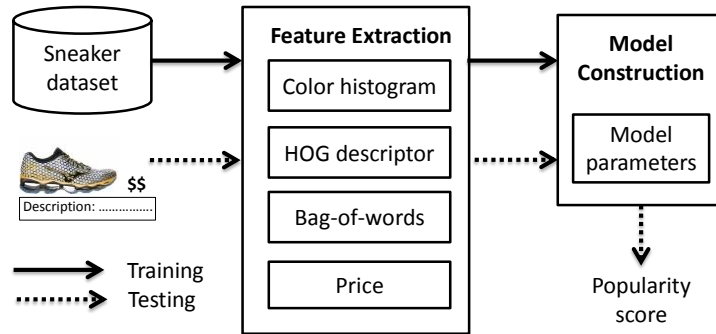
Brand vs. COP score



Product endorser vs. COP score



A multimodality approach



Feature extraction

Textual features

- Sneakers name & description: Bag-of-words model (873-d)
- Price (scalar)

Visual features

- Color: Histogram of pixels in HSV space (256-d)
- Shape: Histogram of oriented gradients (40-d)



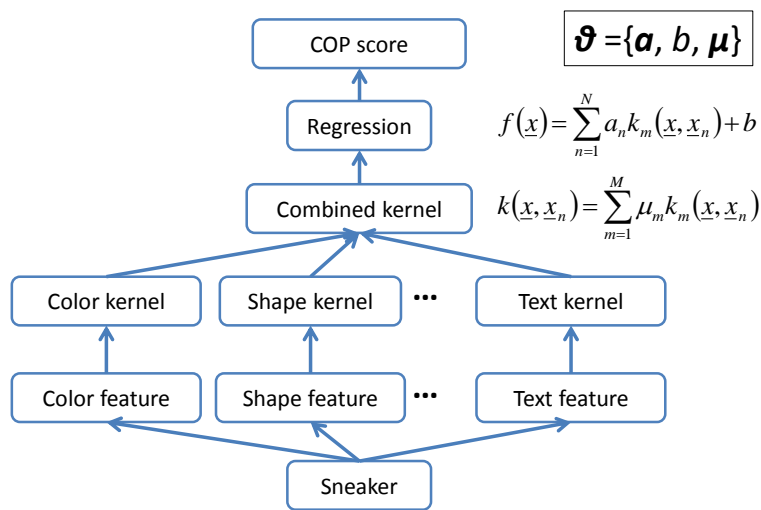
Prediction model construction

- A regression problem:

Given a set of training samples $D = \{(\mathbf{x}_1, y_1), \dots, (\mathbf{x}_N, y_N)\}$, where $\mathbf{x}_i = (\mathbf{x}^T, x^P, \mathbf{x}^C, \mathbf{x}^S)$ and y_i is the desired score, find a solution for unknown model parameters ϑ that minimizes the distortion between the measured and predicted COP scores.

Kernel fusion + regression

Multiple-kernel support vector regression



Kernel functions

Textual features

- Bag-of-words model

chi-square kernel

- Price (scalar)

$$k_p(x^p, x_n^p) = 1 / \left(\frac{|x^p - x_n^p|}{c} + 1 \right)$$

Visual features

- Color: Histogram of pixels in HSV space (256-d)

radial basis function kernel

- Shape: Histogram of oriented gradients (40-d)

histogram intersection kernel

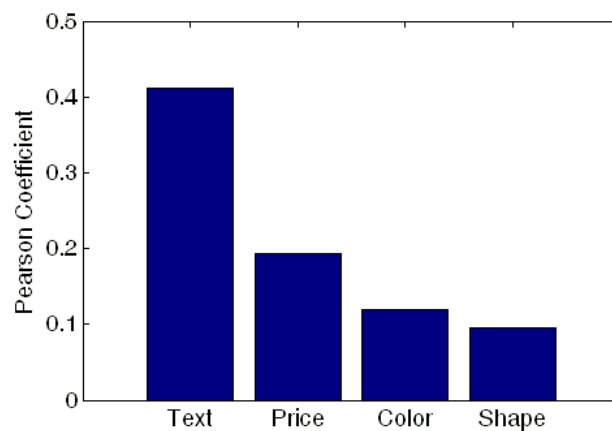
Research questions

- Which feature mostly affects the COP score?
- Does using kernel fusion result in a better prediction performance?
- Do customized kernels perform better than Radial Basis Function (RBF) kernels?

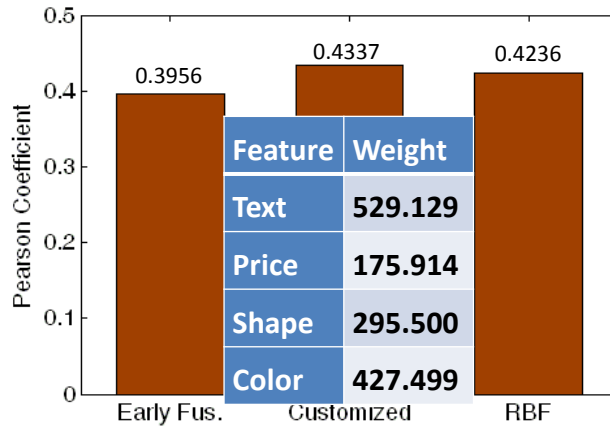
Experiment: Setup

- Dataset
 - 1913 products collected from solecollector.com
 - Training: 1703 (between Dec. 2010 and Aug. 2013)
 - Testing: 210 (between Sep. 2013 and Oct. 2013)
- Evaluation metrics
 - Pearson coefficient

Results: feature comparison



Results: model comparison



Conclusion

- We obtained a satisfactory prediction result by using a few different facets to describe sneakers.
- Textual features play an important role.
- Compared with an early fusion approach, we show that a late fusion approach is more effective.
- Customized kernels in general perform better than the RBF kernels.



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More information:

<http://www.csie.ntnu.edu.tw/~myeh/>