Approaching fashion design trend applications using text mining and semantic network analysis

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Introduction

The fashion industry has embraced the latest technological advancement and has incorporated Artificial Intelligence (AI)and Machine Learning (ML) to enhance the design, manufacturing processes and to forecast trends for consumers benefits.

Fashion Trends Forecasting

- predicting what consumers/shoppers will like and purchase.
- predicting colors, styles, fabrics, patterns etc.
- future trends, creating reports and providing approaches to increase sales and improve fashion designs.

Text Mining

- Knowledge discovery in unstructured text data.
- Analyzing the text to recognize patterns, frequency, concepts etc.
- analysis on social media data, fashion forecasters are getting insights on consumer mindset and driving the buying decisions.
- text mining to classify design variables like the color, style and patterns

Semantic Network Analysis

- Analyzing network with nodes and edges to identify relationships and representing knowledge in patterns.
- brands, designers, words that describe a trend or product can be analyzed to generate a graphic network and visualize the design preferences.

Approach

1. Data Collection — From 2008 to 2018 posts/blogs textual data was gathered from Korean website and search engines Naver and Daum using Textom program for web crawling.
2. Analysis and Visualization — The data was analyzed to determine the seasonal trends. It was identified that the posts were made with the search words mainly during February-April and again from August-October. This helped in classifying the data in spring/summer and fall/winter categories.

Fig. 1

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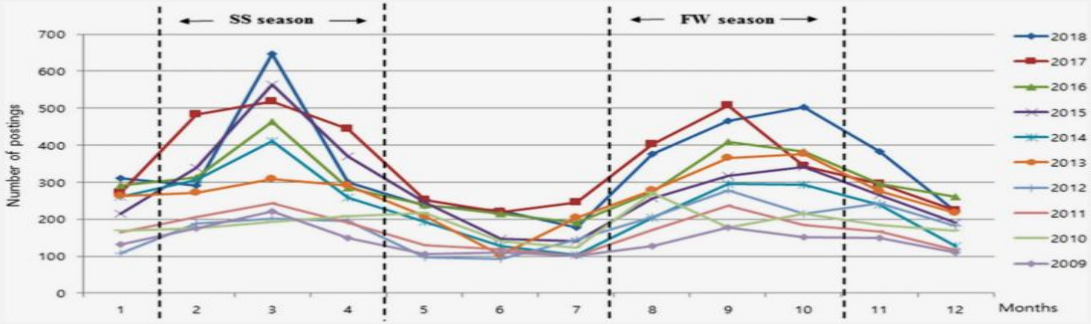

Number of posts collected between 2009 and 2018. The number of posts is high in the period from February to April (spring/summer season) and from August to October (fall/winter season) in the last 10 years

3. Refining data:

   a. Correction Process — abbreviations, plurals and spacing was corrected.
   b. Control Process — similar meaning words were consolidated.
   c. Removal Process — Stopwords, frequency analysis to remove insignificant words by implementing part-of-speech, extracting nouns and adjectives.

4. Extracting fashion design trend words — Semantic network data analysis was performed using UCINET 6.0 to get the degree of centrality (number of edges a node has).

Table 1 Extracted fashion trend words

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Rank	Style		Color		Fabric		Pattern	
	Word	f	Word	f	Word	f	Word	f
1	Retro	600	Black	742	Leather	1036	Checkered	559
2	Chic	539	White	551	Denim	749	Floral	540
3	Classic	551	Blue	295	Padding	482	Stripe	232
4	Military	307	Pink	275	Fur	367	Leopard	180
5	Sporty	245	Red	254	Tweed	296	Animal	91
6	Minimal	164	Grey	137	Lace	168	Dotted	80
7	Punk	123	Orange	118	Suede	101	Geometry	43
8	Feminine	112	Camel	113	Silk	80	Camouflage	37
9	Mannish	105	Brown	111	Linen	76	Lettering	28
10	Futuristic	53	Burgundy	90	Metallic	57	Digital	25

Results

1. Time-series Clustering: Clustering means to group similar data points together. Here the time-series data is grouped based on similarity. Previously mentioned that the data is grouped in 20-season period and this is used to classify the trends into increased, decreased, evergreen and seasonal categories.

Fig. 2

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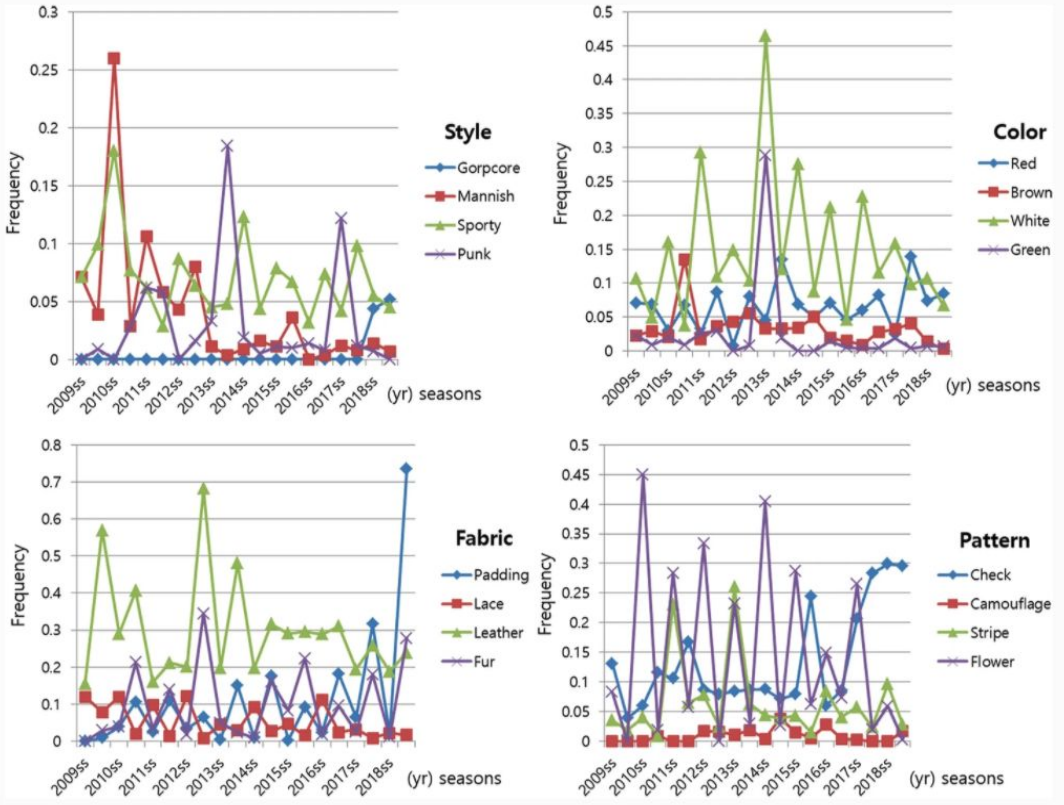
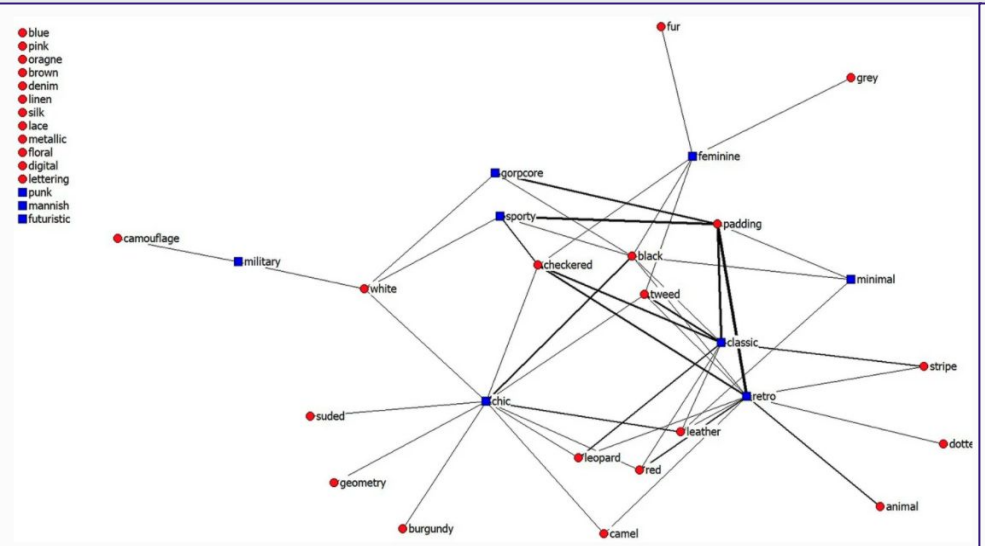
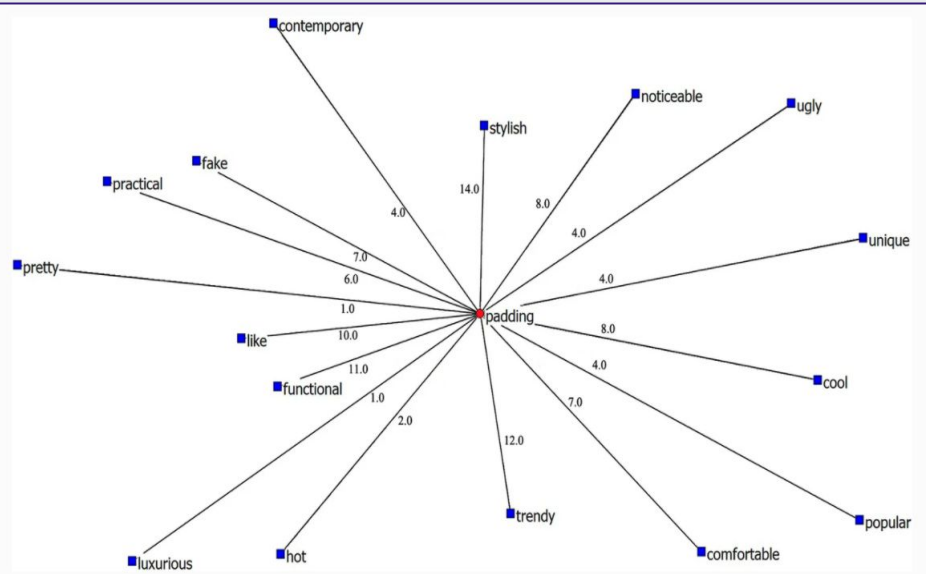


Time-series cluster results of fashion trend words. Increasing, decreasing, evergreen, and seasonal trends of **a** style trend words, **b** color trend words, **c** fabric trend words, and **d** pattern trend words



Semantic network analysis results of 2-mode data on the jacket design feature (2018 fall/winter season). Triangles represent styles, and squares represent other design features (colors, fabrics, and patterns). The thickness of the lines indicates the strength of the links in terms of co-occurrences. Padding has a high degree centrality of 0.455, and it shows strong ties with other design features, considered the dominant fabric trend. Words that could not connect to any design features are shown on the left



The ego network of "padding" (2018 fall/winter season). The numbers on the lines indicate the strength of the links in terms of co-occurrences with sentiment words

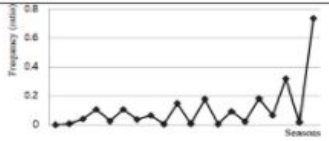
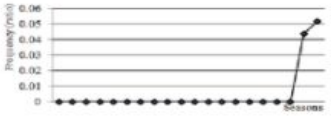
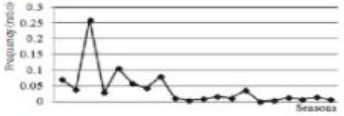
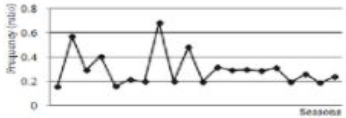
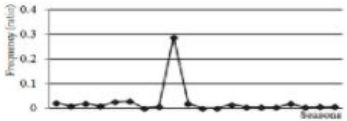
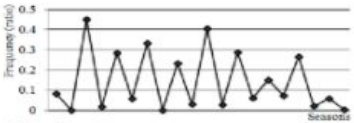
2. Semantic Network Analysis: The results are captured with network visualization using NetDraw. The data was transformed into 11 x 30 matrices of co-occurrences where design features were arranged into columns and style trend words and Gorpcore style were arranged in rows. This 2-mode data was visualized as network.

In addition to this analysis, for a "padding" fabric word sentiment analysis was performed and the reactions were visualized with ego network.

Conclusions

- With the text mining and network analysis the consumer-driven fashion trends can be studied and can be leveraged by designers to make informed decisions. Overall, in this study the fashion trends were clustered in 4 clusters.

- Combining techniques like text mining with semantic network analysis on 29436 fashion posts with focus on “fashion collection and “jacket” keywords over a decade has provided useful clusters that can be expanded with further research and potential method to identify consumer preferences.

Category		Design features	
Increasing	Stable increasing trend		
		Padding fabric	Gucci 2018 SS
	Rapidly increasing trend		
		Gorpcore style	Valentino 2018 SS
Decreasing	Consistently decreasing trend		
		Mannish style	Balmain 2018 FW
Evergreen	Consistently popular trend		
		Leather fabric	Balmain 2018 FW
Seasonal	Temporarily favored trend		
		Green color	Gucci 2018 FW
	Particularly favored trend in either SS or FW		
		Floral pattern	Gucci 2018 SS

References

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