Evolution of fashion brands on Twitter and Instagram

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ABSTRACT
Social media has become a popular platform for marketing and brand advertisement especially for fashion brands. To promote their products and gain popularity, different brands post their latest products and updates as photos on different social networks. Little has been explored on how these fashion brands use different social media to reach out to their customers and obtain feedback on different products. Understanding this can help future consumers focus on their interested brands on specific social media for better information and also can help the marketing staff of different brands to understand how the other brands are utilizing the social media. In this article we focus on the top-20 fashion brands and comparatively analyze how they target their current and potential future customers on Twitter and Instagram. Using both linguistic and deep image features, our work reveals an increasing diversification of trends accompanied by a simultaneous concentration towards a few selected trends. It provides insights about brand marketing strategies and their respective competencies. Our investigations show that the brands are using Twitter and Instagram in a distinctive manner.

Categories and Subject Descriptors
H.4 [Information Systems Applications]: Content Analysis

Keywords
Instagram, Twitter, Fashion, Trends

1. INTRODUCTION
Fashion has a tremendous impact on our society and the increased interest in fashion displays the sign of its importance and generality [10, 15]. It is at the intersection of different fields to understand the collective identity dynamics, production patterns and consumer personality dynamics. Especially today, billions of users on social media make posts that are related to fashion on various platforms such as Instagram, Twitter, Facebook, Pinterest, Tumblr, etc. Social media is not only a dynamic platform for the users but also for businesses where it has transformed the landscape of business communication. This transformation has made it easy for the businesses in relaying information to thousands of consumers promptly, globally and inexpensively. Because of this accessibility, different brands are relying on social media for promoting their products and services, market information and consumer feedback.

There are several studies [11, 18, 17] that focus on understanding the growing interest in social media marketing. Different factors of social media have been studied to understand why it is the new hybrid element of promoting products. A study [9] shows that users on social media believe that companies should have a social media presence and interact with their customers. Other studies [5, 4] focused on the trends in cultural markets and especially to understand this phenomenon using social media data.

The importance of fashion branding on social media is becoming even more pronounced as networks like Instagram are revolutionizing this field. According to the well-analyzed editorials in The Guardian [8, 7] and The New York Times [12], it is the social media that decides what you wear and especially Instagram is titled as the fashion’s new front row. Instagram alone has a significant share of posts that belong to fashion category [14]. During the runway shows as nearly every show attendee attends the show with a smartphone with Instagram account primed [3], it is important for the brands to understand how the trends and other competitors are utilizing this platform.

This paper mainly attempts to understand how the fashion brands are presenting themselves on the social media, Twitter and Instagram in particular. With fashion gaining more popularity as an important reason for social presence for many users, it is not clear from the current literature how different brands use social media. There is a recent work that focused on how recruiting the best fashion models can increase the popularity of the brands and the fashion marketing in social media [21, 27]. To the best of our knowledge, there is no work that studied how fashion brands’ use different social platforms for different purposes. It is important to understand the distinctions and similarities so that the new businesses can adapt these ideas to promote their businesses and establish their brands. Also, this research can help the customers target the brands of their interest for better information.

In this study we consider the top-20 fashion brands and investigate how they use Twitter and Instagram. We first analyze the text associated with the posts (either tweets or captions of photos on Twitter and Instagram) and identify the topics the brands are focusing. To perform this, we utilize the Latent Dirichlet Allocation (LDA) approach that helps in automatically discovering the topics present in the text. We then analyze the images where we extract deep features similar to those extracted by Khosla et al. [16]. These deep features are the last layer neuron activations of a large convolutional neural network that was trained on a common object detection task in a large dataset. In particular, we use the 22nd layer activation of the overfeat convolutional neural network [24]. These features transform the images into vectors on a 4096 dimensional represen-
A minimum of 18 posts and a maximum of 124 posts on Instagram and a minimum of 20 posts and a maximum of 619 posts on Twitter were made by these brands on average every month. Table 2 gives some statistics of the data we collected over the time period of 2008–2015 on Twitter and 2011–2015 on Instagram for all these brands.

### 3. RELATED WORK

Social media has gained a lot of attention to understand fashion, trends of fashion and how different fashion brands perform brand marketing. Currently, there is a large volume of literature [18, 17, 11, 22] that focuses on fashion, brand advertising and social media. Most of the existing literature [13, 11, 22] focuses on how social media marketing activities are performed which can take a variety of forms including, weblogs, social blogs, microblogging, videos, pictures, rating, etc. According to these studies, social media can have a high impact on a brand’s reputation. Literature also focuses on understanding the purchase intention which is a combination of customers’ interest and possibility of buying a product. This purchase intention assumes the consumers’ future behavior based on their current interest. However, as per the best of our knowledge, none of the existing literature focus on comparative studies to understand how the different brands use the different social networks.

In this paper, we address the question of “do fashion brands target different social networks differently in particular – Twitter and Instagram which are becoming the faces of fashion”. There is very little existing work on Instagram that studies fashion where one study [21] focuses on predicting the success of fashion models through their Instagram posts. We hope that this study can inspire marketing and social science researchers to understand the factors that lead to distinctive behavior on different social networks. This study also helps different brands either global or local to understand the business strategies on different social platforms for better promotion of their products.

### 4. BRAND BEHAVIOR ON INSTAGRAM

To investigate how these brands use Instagram, we first compute the frequency of posts per month by each brand (using eq. 2). Then we compute the average number of likes, average number of comments and the average number of hashtags for all posts of brands which are shown in Figure 2.

Suppose $n_j^{(t,b)}$ and $n_j^{(i,b)}$ are the number of posts made on Twitter and Instagram by the brand $b$ respectively in the time period $j$. $p = \{t, i\}$ refer to the platform Twitter and Instagram respectively,

$$M^{(p)}_i = \prod \{\sum m^{(p)}_i\} \forall i$$  \hspace{1cm} (1)

For the sake of convenience, we use a monthly time period
Figure 1: A timeline showing the creation dates of accounts by the brands on Twitter and Instagram

Figure 2: Different statistics showing the brand behavior on Instagram

is the vector that is an indicator function (1) for each time period, indicating whether any posts at all were made during that time period. It is 1 if any posts were made and 0 if not. Then,

$$\omega_p = \frac{P_t}{\sum M_i^p},$$ (2)

is the average frequency of posts made by a brand on the platform $p$.

Based on the results shown in Table 2, we notice that the brands Michael Kors (MK) and Burberry (Brb) created their accounts at the same time and have similar number of posts. But in terms of the number of followers, MK has 24% more number of followers than Brb and MK follows twice the number of people followed by Brb. When we consider the number of likes and comments, MK get 3 times as many likes and comments that Brb receives. From the table we also notice that hashtags do not provide an answer for this behavior. One reason can be that the primary focus is on the product for photos posted by MK where as for Brb it is not and users may tend to like the posts which focus on products more. Price can also be another factor as the products of MK are relatively very cheap compared to Brb. Brands like Free People (FP) created an instagram account during summer of 2011 and post pictures with a very high frequency (124 pictures on average every month). When we observe the number of likes and comments, they are around 20k and 136 respectively which are neither high nor low compared to other brands. This example may suggest that frequency rate doesn’t affect the visibility (likes and comments) of posts.

5. BRAND BEHAVIOR ON TWITTER

On twitter, users can submit content through (a) self (text) submissions that are stored on the twitter itself and (b) through links to external web content. The majority of these brands posted content that is stored on the twitter itself. All of these brands have on an average 87% of the tweets contain pictures of their products or models showcasing the brand’s products. Some of these brands have links to external web content like for example, majority of the posts made by Gucci have images hosted on Instagram. Figure 3 gives information about the frequency of posts, hashtags, favorites and retweets of posts for the brands in $D$.

6. INSTAGRAM VS TWITTER

6.1 Non-Visual Features

In this section we compare the posts on Instagram and Twitter by considering the non-visual content which is the caption for a post on Instagram and text of a tweet on Twitter. As a first step, we compare the number of posts, followers and friends on both the platforms of all the brands which are displayed in Figure 4. The key observation is that the posts made on Instagram get very large number of likes compared to the favorites of posts on Twitter. This can be due to the fact that on Instagram a post is a photo which speaks better than words. Also, Twitter allows posting photos that are hosted on external sources like Instagram that can lead people to migrate to join those external photo-sharing platforms which will be explored as a part of our future study.

These plots clearly suggest that the number of posts do not deter-
mine the number of followers (for example Vans). It is very interesting to notice that all the brands have more number of followers on Instagram than on Twitter except Free People and Burberry. This suggests that following large number of users does not guarantee large number of followers.

Figure 4: Comparison between Instagram and Twitter on three attributes (a) Media (b) Followers (c) Friends

6.1.1 Popular Trends or topics
We use the LDA approach [6] to understand how the brands focus on different topics using the textual features. To discover the topics, we use the Twitter LDA package [23]. We consider the captions or text attached with all the posts of a brand and try to understand how the topics vary across all the brands on the two platforms. Using LDA, we found 10 topics overall across all the brands on both the platforms. Table 3 presents the 10 words associated with the discovered topics.

Using the topic distributions obtained through LDA, Table 4 shows the topics focused by each of these brands on Twitter and Instagram. We can notice that the runway luxury fashion brands like Louis Vuitton, Dolce Gabbana, Burberry, etc., focus on the same topics in Twitter and Instagram. Only brands like Nike, Adidas Originals, Vans, Converse and Free People focus on different topics on the two platforms. Nike being the most popular brand on Instagram focuses mainly on topic 7 whereas on Twitter focuses on topic 0 where the words associated with topic 0 suggests that Twitter might be used for correspondence or queries. We find that brands like Burberry focus mainly on British style and includes men’s collections and Michael Kors focuses on the styles and accessories. The active brand according to the number of friends – Louboutin World uses both the networks to contact the customers online similar to Cartier. This analysis discovered that certain brands use Twitter to contact customers but use Instagram for advertising their products. Also these networks have posts of celebrities wearing certain brands and there by promoting these brands – Dolce Gabbana, Armani and Prada.

6.2 Visual Features
To analyze the visual content of both the social networks, we use the dataset of images and extract deep features. Deep learning is being used to convert data of various modalities into representations where the entropy is structured and ordered according to some tasks they are trained for. For instance, if a deep Convolutional Neural Network is trained for some prosaic task such as object recognition, they learn a distributed representation and map the images on to a vector space that carries details related to arbitrary semantics such as objectness, color, texture etc. Depending on the layer at which these representations are probed, one can glean a reasonable semantics. For instance, the earlier layers of a deep CNN seem to encode more edge and Gabor-like features while the latter layers seem to encode more meaningful features.

Often times deep features are used in transfer learning, where the networks are trained on one task and are used to create representation and analysis on other tasks. The transferability of CNN features was well-studied by Yosinski et al [26]. Following this line of thought, one could essentially train a deep CNN on a large enough dataset such as the Imagenet, and use the learned network to extract image features for arbitrary task such as unsupervised clustering [19]. Most networks that are used in the Imagenet competition are made public. It is a common practice to use these off-the-shelf networks to extract imaging features.
Table 4: Topics focused by the brands on Twitter and Instagram obtained using LDA approach. The ids can be mapped to the words as shown in Table 3

<table>
<thead>
<tr>
<th>Brand</th>
<th>Instagram</th>
<th>Twitter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nike</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>Adidas Originals</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>LouisVuitton</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>DolceGabanna</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Michael Kors</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Adidas</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Dior</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Louboutin World</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Gucci</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Prada</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Burberry</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Vans</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Fendi</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Armani</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Converse</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Jimmy Choo</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Free People</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>Calvin Klein</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Ralph Lauren</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Cartier</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

In this article, we use the overfeat networks’ image features [24]. Overfeat is a very popular network and is considered one of the state-of-the-art in image classification. We chose overfeat for two reasons. As argued by Khosla et al., overfeat-type features are particularly capable of extracting representations that are well-suited for internet images and abstract tasks. Overfeat is a stable implementation that makes use of GPU in the efficient extraction of features for large scale image datasets. We use the network’s 22nd layer representation for each image as the feature vector corresponding to the image. We then perform clustering on this space and use those clusters results to study the different marketing strategies utilized by the brands and how it affects the visibility of their products.

### 6.3 Marketing Strategies

In this section we study how brands use the two marketing strategies – direct marketing and indirect marketing. Direct marketing focuses on the product more and less on other attributes which is vice-versa in indirect marketing. We first conduct an analysis along both brand and cluster category to understand these strategies. Figure 5 displays the brands $b_1$ – Dolce Gabanna, $b_2$ – Gucci, $b_3$ – Michael Kors along the cluster types – $C_1$ – Products, $C_2$ – Runway/Redcarpet events, $C_3$ – Portraits for both Instagram (top row) and Twitter (bottom row). Brand $b_1$ focuses on direct marketing on Instagram but doesn’t make posts of category $C_1$ where as it focuses on indirect marketing w.r.t category $C_3$. Brand $b_2$ follows the similar trend as $b_1$. Whereas, brand $b_3$ primarily focuses on direct marketing no matter what category it is.

Now we analyze how the brands which focus on similar topics according to Table 4 conduct marketing. Among all the brands, Nike has the largest number of followers and the number of likes received for a post. Adidas focuses on the same topics as Nike and we measure how the photos differ among these two brands. Each row in Figure 6 corresponds to a cluster category where Nike and Adidas both post similar kinds of photos except that Nike and Adidas has a unique cluster focusing on the tank tops and track jackets respectively. Both the brands focus on direct and indirect marketing and it would be interesting to explore the factors that contribute to more visibility of posts made by Nike.

We now analyze the two runway brands Prada and Armani which focus on the same topics. Figure 7 shows that even if both the brands has some common clusters, there are distinctive cluster categories. Prada posts contain floral patterns with no architecture and not much focused on products. Where as, Armani has photos with text, photos that focus on indoor architecture and photos of products. This discovers that posts made by brands practicing indirect marketing strategies can have more visibility. We hope that these explorations could draw the attention of market researchers to study if the type of marketing could lead to more visibility in terms of obtaining more likes and comments for posts on Instagram.

### 6.4 Faces vs Visibility

In this subsection we study if photos that has people (either fashion models or celebrities endorsing the brand or the personnel) will get more visibility. For counting the number of faces, we use the reliable Viola-Jones face detector algorithm [25]. The face detector works on collecting Haar-like features and uses a cascade of boosted trees to identify and count faces [20]. This detector is run...
over an image in overlapping patches and after a non-maximal suppression, we get a count and locations of all the faces in the image. One stable implementation of this is the OpenCV Library’s face detector. This is a stable state-of-the-art implementation and we trust it’s reliability in detecting the number of faces. Results across all the brands in Figure 8 show that photos posted on Twitter contains more faces than the photos posted on Instagram.

7. CONCLUSIONS

In this paper, we performed an analysis of posts made by the top fashion-related brands on Instagram and Twitter – the new faces of fashion. To the best of our knowledge, this is the first study that performs a comparative analysis of fashion brands on social media. The main aim of this research is to study how the fashion brands use different social networks. This analysis revealed that the fashion brands indeed make distinct posts on Twitter and Instagram. Different brands utilize direct and indirect marketing strategies for promoting their products. We can divide our results into two sections. Firstly, from the statistical analysis we learnt that Instagram posts receive more visibility in terms of receiving more likes and comments. Secondly, from the content analysis mainly by utilizing LDA to understand the types of topics focused by different brands, most of the runway brands focus on same topics across these two social media platforms where as brands like Nike, Free People, etc., focus on different topics. Results show that Twitter is used by certain brands exclusively to communicate with the customers and Instagram for brand advertising. Using deep image features revealed that brands use both direct and indirect marketing in different scenarios and further research is needed if the type of marketing leads to more visibility of brands on these platforms.

8. REFERENCES