Automatic Fashion Knowledge Extraction from Social Media

Yunshan Ma, Lizi Liao, Tat-Seng Chua
National University of Singapore
yunshan.ma@u.nus.edu, liaolizi.llz@gmail.com, dcscts@nus.edu.sg

ABSTRACT
Fashion knowledge plays a pivotal role in helping people in their dressing. In this paper, we present a novel system to automatically harvest fashion knowledge from social media. It unifies three tasks of occasion, person, and clothing discovery from multiple modalities of images, texts, and metadata. A contextualized fashion concept learning model is applied to leverage the rich contextual information for improving the fashion concept learning performance. At the same time, to counter the label noise within training data, we employ a weak label modeling method to further boost the performance. We build a website to demonstrate the quality of fashion knowledge extracted by our system.

CCS CONCEPTS
• Information systems → Information retrieval; Multimedia and multimodal retrieval.

KEYWORDS
Fashion Knowledge Extraction; Fashion Analysis

ACM Reference Format:

1 INTRODUCTION
Fashion is an integral part of human’s daily life. Dressing well needs to consider not only the visual appearance of clothing, but also social conditions like the occasion and human identity. However, most existing works only focus on recognizing clothes, and few explore fashions at knowledge level. Fashion knowledge usually involves the interplay among three main aspects: person, clothing, and occasion. In general, social media sites such as Instagram provide a huge amount of user generated contents. A large portion of it contains people’s up-to-date dressing codes involving the aforementioned interplay. It is indeed a natural and appropriate source to extract fashion knowledge.

In this paper, we devote to developing a system to automatically extract user-centric fashion knowledge from social media. An illustration of it is shown in Figure 1. Here we aim to extract occasion, person, and clothing – the three main aspects of fashion – from social media posts which consist of multi-modal information like images, text, and metadata. However, fashion knowledge extraction from social media content is highly dependent on the performance of fashion concept prediction which has not been well addressed. Moreover, social media data lacks sufficient fashion concept labels which are crucial for fashion knowledge construction. To tackle these two problems, we first take advantage of the dependencies and correlations among different fashion concepts to improve the performance of fashion concept learning. Second, to alleviate the label insufficiency problem, we enrich the learning procedure with a weak label modeling module that utilizes both the machine-labeled and clean data.

2 FRAMEWORK
We present the architecture of our proposed system in Figure 2. The first layer is the social media crawler. In the second layer, we employ multiple automatic filters to filter out posts that are not suitable to extract fashion concepts. Next, we employ fashion concept detection models to extract the fashion concepts. Lastly, we index all the extracted fashion knowledge and social media posts and build a website to access and query the fashion knowledge.

Specifically, the crawler gets the images and side information, and inputs them into the filters. After filtering, the remaining high-quality posts are fed into detectors to extract fashion concepts.

Figure 1: An illustration of fashion knowledge extraction from social media. It aims to extract triplets of <occasion, person, clothes> from multimodal inputs.

Figure 2: The overall architecture of our proposed system.
related to occasion, person, and clothes. Finally, the fashion concept
triplets and the associated social media information are organized
into a knowledge base for further fashion knowledge search.

Among the four layers of this architecture, the most crucial part
is to detect the fashion concepts from the posts. Figure 2 shows our
detection model. (1) We design a contextualized fashion concept
learning model, in which two bi-directional recurrent neural net-
works are utilized to model co-occurrence among occasion, clothing
attributes and categories. (2) We introduce a weak label modeling
module to leverage the large amount of cheap machine-labeled
training data. For more details, please refer to [1].

After extracting the fashion concepts, we construct a triplet
(<occasion, person, clothes>) for each cloth, which is the candidate
of fashion knowledge we aim to harvest. We aggregate all the
triples and instances to construct a fashion knowledge base. We
design a website as an interface to access and query the extracted
fashion knowledge extracted by our system. As shown in Figure 4,
the well-organized repository provides a useful platform for us to
query and discover fashion knowledge and trends.

3 IMPLEMENTATION

Crawler and Filter. We crawl Instagram posts by hashtags, which
are manually chosen and cover 10 occasions. However, a large por-
tion of the posts are unrelated to fashion concepts. Thus, we first
detect the faces and bodies in the images and remove those images
which do not have any face-body pair. To ensure the visibility of
clothes, we only keep those images with proper face-body-image
ratios ($\text{height of face} / \text{height of body} < 0.2$ and
$\text{height of body} / \text{height of image} > 0.5$). Moreover, we train a binary classifier on images to help us remove those
images of posters, news or advertisements.

Detector. We first use a pre-trained object detection model to
detect the clothes (bounding boxes and rough categories) in the
images. We then implement the contextualized fashion concept
learning model to predict the occasions, categories and attributes of
clothes. In this paper, we use 10 occasions, 21 clothes categories, and
8 clothes attributes with 50 attribute values. A pre-trained gender
prediction model is used to predict the gender.

4 CONCLUSION

In this paper, we constructed a system to automatically extract
fashion knowledge from social media. We demonstrated the system,
presented the techniques employed, and shared our experience in
dealing with the challenges in this field. Several points could be
further explored in future to improve the fashion knowledge
extraction system including trending analysis of different fashion
concepts and influence diffusion analysis among social networks.

ACKNOWLEDGEMENT

This research is part of NeXt++ project, which is supported by the
National Research Foundation, Prime Minister’s Office, Singapore
under its IRC@SG Funding Initiative.

REFERENCES

[1] Yunshan Ma, Xun Yang, Lizzi Liao, Yixin Cao, and Tat-Seng Chua. 2019. Who,
Where, and What to Wear? Extracting Fashion Knowledge from Social Media. In 2019
ACM Multimedia Conference on Multimedia Conference. ACM.