

## Framework for Recognition and Categorization of Online Shopping Items

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### 1. Introduction

The market size of electronic commerce have been increasing rapidly from early 21th century and is assumed to be \$1.1 trillion in 2012, increased about 14.5% from the previous year. Fashion items including clothes, accessories, and shoes are one representative goods with by electronic commerce. On the other hand, consumers often suffer difficulties to find out what they want since there are too many candidate shopping items and moreover the items are not arranged well. For example, there shows about 5 million results when a t-shirt is searched on Naver, one of Korean portals. There are many studies on items recommendation schemes and object recognition. In [1], they suggest that the problem of selecting a good model can be recast as a recommendation problem, where the goal is to recommend a good model for a particular task based on how well a limited probe set of models appears to perform. In another study [2], they propose a cooking recipe recommendation system which employs real-time visual object recognition of food gradients, and recommends cooking recipes related to the recognized food ingredients. In [3], they consider an approach to the development of categorization systems based on building by a robot of its own semantics, which used only by the robot and is not designed for human perception. Although there are many studies on object recognition and categorization, there is little study on item search and recommendation system based on pattern recognition and automatic categorization. We propose a service framework to make online shopping of various fashion items easier based on pattern recognition.

### 2. Proposed framework

The main purpose of the proposed framework is to help online fashion item shoppers to search and select preferred items among great number of similar items without great difficulties. It is to recommend shopping items which satisfy personalized conditions and moreover the system expands automatically to include information of huge number of daily new items. Working procedure of the proposed frame is shown in figure 1.

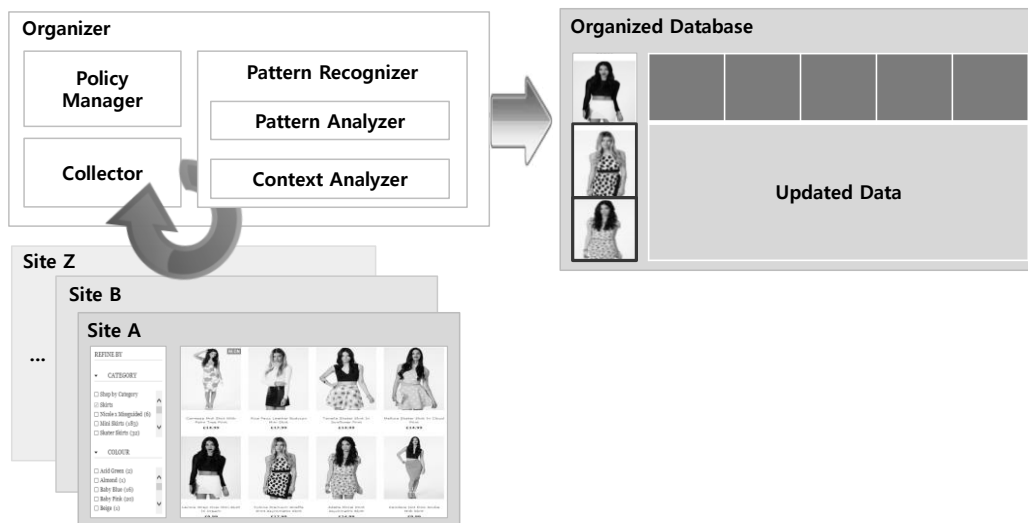


Figure 1. Contents notice conditions

The proposed framework, namely the *Organizer*, is composed of several main functional modules: *Collector*, *Pattern Recognizer*, and *Policy Manager*.

*Collector:* The collector has automatic data collection functions from related websites. Automatic image and data collection is one of main requirements of the proposed framework since manual image/data collection will be very hard to cover rapidly increasing new online data. The data to be collected includes i) images of shopping items, ii) data which is helpful to identify and characterize the corresponding shopping item such as the model number of the item, the price, the brand, the color, and so on.

*Pattern Recognizer:* The pattern recognizer is composed of two kinds of analyzers, pattern analyzer and content analyzer. The pattern analyzer is a kind of pattern recognition function which is specialized for fashion items such as clothes, accessories, shoes, and so on. Pattern recognition is another main function in the proposed framework. It analyzes design characteristics of shopping items using the automatically collected images. The design analysis result may include various design characteristics such as the colors of parts of a clothes including sleeve, back, cuff, collar, and so on, the number of buttons on sleeves, plackets, and cuffs, overall design pattern, etc. When some new images are collected, the pattern analyzer recognizes the pattern of each item and place it to an appropriate category. Through this procedure, shopping items database can be expanded automatically and timely. The category of design characteristics can be defined manually in the first stage of the recommendation system, however, it is to finally define the categories automatically by unsupervised learning of pattern recognition. The context analyzer analyzes metadata of each item to help categorizes each item more specifically. End users can set two kinds of search conditions derived from pattern analysis and context analysis.

*Policy Manager:* The policy manager has responsibility for the policy management of the overall organizer. The policy may include automatic update policies such as update period, learning period of the pattern recognizer, pattern categorization policy, and so on.

### 3. Conclusion

The role of the proposed organizer is to help online fashion item shoppers search and find the preferred items that satisfies personalized design and other conditions. Although some kind of such organizers are already adopted and used to support online shoppers, the shopping items it covers and the conditions which shoppers can configure is very limited since the shopping items organization is executed manually. The proposed organizer is to update and analyze design pattern and item information automatically and the pattern analyzer execute unsupervised learning of design patterns. Therefore it can treat most online shopping items and more specific design conditions. The proposed organizer is expected to be applicable to online shopping system as a shopping items categorization engine.

### 4. Acknowledgment

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### 5. References

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