Fatching: Deep Learning Based Fashion Recommendation Application

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Abstract

Deep learning technology, which was mainly used in the systematic part, is now developed to the point where it gives the people the feeling that they are directly using it from a closer distance. We are trying to develop something innovative that will provide convenience to users using deep learning. The theme of this paper is to create an application that recommends various clothes that best match the item for fashion items held by users using deep learning.

Previous studies have only searched and shown similar clothes for clothes or informed them of the so-called lowest price, and studies on fashion recommendations have only recently emerged. In addition to creating a fashion recommendation system, we will develop an application that allows users to take pictures of their clothes themselves and create a daily look that makes them want to wear them when they go out within seconds.

1   Introduction

The overall growth rate of the fashion market has grown by about 10 trillion won over the past decade. One of the main reasons for this is that SNS activities become more active due to the spread of smartphones along with the emergence of various online shopping malls, and it is possible to access various fashions more frequently and more easily. However, due to the confusion caused by excessive fashion information provided by numerous fashion media and the rapidly changing nature of fashion trends as time goes by, many people still have difficulty deciding what combination to wear, or simply which cloth goes well with others.

In order to solve these difficulties, many existing online fashion stores and communities recommend customized coordinates or products. However, these

sites provide one-sided information and recommendations through pre-set photos of professional models, and often show products or combinations that customers have purchased a lot without a comparison group.

Therefore, in this project, we will classify fashion images using deep learning to solve the above problems, and design a recommendation program using this. We will implement a deep learning algorithm that uses K-fashion images to determine how many clothes are combined with a particular item and whether it is an appropriate match. We will use this to create a mobile application that recommends which type of clothes is well matched with the items a customer has or wants to purchase, and will prepare measures to solve the limitations of existing fashion stores.

2   Motivation and Objective

The reason why we chose the theme of recommending fashion items is that people think a lot and spend a lot of time to choosing clothes. In addition, it is possible to induce reasonable consumption by using an application that recommends a fashion item desired by a user. It is also possible to minimize the amounts of resources consumed for clothes that are bought and worn once or thrown away. In addition, considerable commercial value is expected when collaborating with shopping malls using fashion recommendation applications.

The most special thing about the fashion recommendation items we make is that users take pictures of their own clothes and get recommendations for clothes that best match their clothes. The existing system remains at a level such as recommending clothes that best match any clothes in the shopping mall or cheaper clothes of similar shape. Therefore, we intend to create a deep learning model that recommends clothes by analyzing colors, areas, sizes, and patterns for clothes that users take pictures of. In addition, we will create a function to select detailed options for users.

There is actually no correct answer to recommending fashion items. This is because each person has a different favorite clothes and different styles. When program recommends clothes that responded well (by deep learning) to someone else, it's not less likely that that person doesn't like them. Therefore, the appearance of the final system we create is to create a program that recommends fashion items that suit individual user's tastes by applying the user's choice to deep learning algorithms when individual users use this system for a long time.

3 Background and Related Work

3.1 Advances in Artificial Intelligence and Fashion Service

Deep learning-based artificial intelligence helps users make faster decisions by learning and classifying information that users may be interested in from mixed information. In the current fashion industry, artificial intelligence is becoming the basis for personalized fashion recommendation services, such as those served by highly skilled store staff.(Table 1)[1] Fashion AI also maximizes the efficiency of online product purchases by eliminating information complexity and saving time because it recommends better products based on customer preferences.

Table 1: Advances in Artificial Intelligence and Fashion Service

	1990s	2000s	2010s to current
AI stage	Data-base searching	Machine learning	Deep learning
Information flow	Concentration and sending	Distribution and sharing	Circulation and accumulating
Service acceptance	Passive	Selective	Active
Fashion service	One way distribution of professional authoritative information into a printed magazines	Subjective option information is shared across mulichannel	Customized information through big data analysis of artificial intelligence is recommended through personal channels

3.2 Related Work on Fashion Recommendation Service

Content-based filtering recommends appropriate styles by applying customer's personal information to product profiles. China's Alibaba Group identifies users with two-dimensional codes and facial recognition based on the big data of 500,000 Taobao members, and recommends products based on their existing purchase history and tastes.[2] Zozo town, which creates a body profile by applying artificial intelligence measurement technology, uses 3D body scan technology to measure body size so that when customers purchase clothes, they skip the process of visiting a store, fitting, and worrying about size. Instead, it make possible to select various styles of products suitable for the body type of people.[3]

Recently, fashion companies are providing more advanced image tag services through partnerships with IT companies. Amazon's Echo look recognizes the user's wearing photo through the artificial intelligence system Alexa, and quantifies the results of machine learning on fit, color, and styling and results on fashion styling based on current trends.[4] Furthermore, Coded Couture, introduced by Google, utilizes GAN(Generative Adversarial Network), which is attracting attention as a next-generation deep learning algorithm, to collect

smartphone data such as climate, lifestyle, and frequently visited places of the user's residence for one week. After that, Coded Couture has put into practice a service that produces personalized clothing based on the collected data.[5]

4 Problem Statement and Proposed Solution

The problem of current services is that they do not recommend items suitable for the clothes that users have. To solve this problem, we devised a fashion matching service, 'Fatching' that analyzes a picture uploading by users and recommends a suitable item related to it.

'Fatching' consists of two steps. The first step is classification. When users upload a photo of the item to the application, the application analyzes features of the item in the picture through object detection algorithm. In this step, top and bottom are classified as large categories, and detailed classification such as length and color is performed within them.

Second step of the service is recommendation algorithm. Like Amazon's Echo look and Coded Couture, the application would be recommend several items which go well with a given item based on deep learning. In order to train a model which performs the above function, large data set should be needed and appropriate metric should be used.

To train the model more precisely, 1.2 million photos provided by AI-hub would be use. However, in order to offer optimized information to various users, data should be needed to be divided by style and model should be trained each style separately. For this purpose, data would be collected much more through Google and Instagram.

The performance of a recommendation algorithm is evaluated by metrics. Although there are various metrics, root-mean square error(RMSE) and F1 score would indicate the accuracy well. The former is widely used in evaluating and comparing the performance of a recommendation system model compared to other models, and the latter ranges from 0 to 1, where a value close to 1 represents higher recommendation or prediction accuracy. If two metrics are used together, a more utilized model could be trained.

5 Planning in details

The project plan is as follows. First, the entire project will be subdivided into subtasks, and weekly work plans will be established to handle tasks assigned to each member.

5.1 Subtasks

We subdivide our tasks into 4 subtasks. Collecting datasets, designing deep-learning model architecture, front-end and back-end.

Prior to collecting dataset, we should recognize that there is no clear criterion in fashion and be wary of biased datasets being collected. To prevent a skewed result, we will classify collecting data by category. We have already collected 1.2 million samples of fashion images uploaded to shopping malls in Korea through AI-hub, and will collect additional data through Google search and Instagram.

We adopted content-based filtering as an algorithm that recommends fashion to users. By defining a picture of the clothes uploaded by the user as a keyword, the user's profile is configured and best-matching items are recommended. We are considering two deep learning techniques, one is the AutoEncoder technology and the other is the Modified Bayesian network.

In front-end part, we aim to configure UI of the application that directly interacts with users. There would be one main page and an advance search page. It aims to provide a clear UI that is easy to recognize and to provide users with performing functions with minimal touch.

The back-end part is responsible for storing and managing collected fashion data and setting up a server to connect with the database. The goal is to allow users to receive recommended fashion from the server as soon as possible, and to maintain the collected data.

5.2 Assigned Tasks

- (Designing deep-learning model) Bomin will be in charge of collecting dataset and designing deep-learning model. Other team members will also help these tasks.

- (Front-end) Jaehyuk and Juwon will be in charge of designing the application UI, and connecting front-end to back-end.

- (Back-end) Hankyu and Kyunghyun will be in charge of setting up and maintaining the server and database.

- After a series of subtasks are completed, we will all participate in debugging together.

Table 2: Detailed Project Schedule

	Oct Wk1	Oct Wk2	Oct Wk3	Oct Wk4	Nov Wk1	Nov Wk2	Nov Wk3	Nov Wk4	Dec Wk1
Bomin	Study prior works		Build a model				Connect model to server		Debugging
Jaehyuk	Collect data for DL		Develop app				Connect FE and BE		
Juwon	Design the app		Develop app				Connect FE and BE		
Hankyu	Set up server/DB				Server/DB management				
Kyunghyun	Set up server/DB				Server/DB management				

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