

PinPlace: CNN based location image search and its adaptation to social network

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Abstract. We can get geographic location from place pictures. CNN based place recognition already exists, but there is little in domestic research and they are not practical in that they gives only place recognition function. Therefore, we are planning CNN based place recognition in several Seoul hot places which are targeted as MZ generation preference. In addition, we will add posting function. By this function, people can comment places which someone want to know from picture. We think this function can help sharing information about places. Finally, this would be merits in commercial or tourism industry.

Keywords: CNN · Place recognition · Social networking · MZ targeting

1 Introduction

We often see photos posted by others and want to know the place or information about the place. In this case, we wondered how we can know the location of the photo. There are two ways to find the location of a photo through a photo.

The first is to use the location tag. When taking a photo, the location tracking function is used to record latitude and longitude information into the photo, which is called a location tag. This allows us to know where the photo is taken. However, in this case, the location tag disappears if it is photo that you did not take, and you cannot use it in the case of a place photo saved by capturing. App camera is also capturing way.

The second method is the image search function. A typical example is Google's image search function. This function search images by using photos you already have, but it was not efficient for our purpose because it supports not only place photos but also various other kinds of photos.

To supplement the problems of the methods above, we decided to use a technology called CNN among deep learning tech. It is to identify and inform the location information with the photo that the users want to know where, and further apply it to the social network.

2 Study on background & related work

2.1 What is CNN?

Let me explain the CNN first. CNN stands for Convolutional Neural Network, and the principle of this technology is to first automatically create a filter to extract features from the image. This process is called convolution. In this way, we generate feature maps.

Next process is called pooling that reduces the number of dimensions and extract only important features. By repeating this process, feature maps with more complex patterns are formed. And Through these features, specific photo information is mapped and learned. This process is called a fully connected.

2.2 Related work

Binary feature detectors and descriptors(No CNN) First, it is an example of using a technology called binary feature detectors and descriptors rather than CNN technology. With this technology, visual place recognition can be implemented with high accuracy regardless of location or seasonal changes. However, at present, CNN technology is more accessible, so we plan to proceed with our project using CNN.

Russian tourism apps based on CNN Second, there is a study of tourism apps in Russia using CNN. This app has an AR-based location marking module and a CNN-based location-specific module. Uncomplicated CNN models are used to minimize the size of the app. However, there was a limitation that the AR module and the CNN module were completely separated and operated. we can just use CNN only. This way is more simple.

Google image search Third one is Google image search, which is an existing service. Google Image Search provides images that are similar to keywords associated with that image when a user uploads an image file. However, as I said before it provides not only photos of places. So we thought it is not fit into our project

Research on Seoul landmark prediction Lastly, a study similar to the direction we want to proceed. In this study, they implement CNN based on location info search service, when you input a photo of a landmark in Seoul, information about the place is output, they used about 9000 photos for data source. And they showed pretty good performance. It seems that our project can also expect high performance.

3 Problem & proposed solution

CNN based place recognition already exists, but there is little in domestic research. Also, they give only place recognition function. As this reason, they are not practical.

So, we are planning CNN based place recognition in Seoul and we will add posting function just like sns form such as Facebook, Instagram. We think this function can help sharing information about places. And this would be merits in commercial or tourism industry. This can be differentiation compared with existing research.

4 Project plan

Our plan is divided into three parts, front end, building CNN models and back end.

4.1 Front end

At first in front end, we wanted to create a service that allows users to easily use the CNN model we developed. Therefore, we decided to embed and show the CNN technology we created in the web app. Web apps provide four main services.

1. The function of finding a place when a user uploads a picture.
2. The function of listing up hot places and showing the user.
3. The ability to collect data from the next area by uploading photos that users can learn.
4. The My Page function that allows users to manage the stored places among the places they have learned and the SNS function that allows users to view the places they have stored.

We plan to design an intuitive UI by considering UX first, and we will use "Figma" which is UI design program for building UI.

4.2 Building CNN

In building CNN part, we will follow the process bellow.

- First of all, we choose 10 classes of CNN which is discussed among teammates and referenced by internet searching. 10 classes are popular places in MZ generation such as N seoul tower, hongik univ kt&g sangsang madang gallery, ickseon-dong hanok village, naksan park, jamsil lotte tower, myeongdong catholic cathedral, the Hyundai soul mall, haebangchon café the loyal food, han river sebit island, dongdaemun design plaza.
- Then we will collect images by crawling using python beautifulsoup or selenium library. we also use image data generator by keras library.

- Next, we remove duplicated pictures and non-related pictures with our hands. Duplicated picture can be removed by searching same file size. Then we can briefly do pretreatment.

We are considering of three cnn models. alexnet, vgg16, resnet101 and processing in Google colab. We can test this models and compare performance, then we adopt that. Finally we will save the model by .h5 files and transform it compatible with web java script.

4.3 Back end

In back end part, we will connect cnn models into web app by transforming file. We save the CNN model by ".h5" file, and then transform it to ".json" file by using "Tensorflowjs". We also build database to save image data from users by using "MySQL". We will build server by using "Nodejs".

4.4 Role distribution

Jung chae won takes making UI and web programing in main pages, cnn implementation pages and postingpages.

Lee jisup takes web programing in hot place list pages and pages about collecting images from users.

Chae seung yun takes image pretreatment, building cnn models and test them and comparing performance.

Hong sung jun takes collecting images from goole and Instagram by crawling and then searching cnn models and helping cnn building.

Uhm ji yong takes backend such as establishing db and server, connecting cnn models into web app.

4.5 Schedule

Table 1. Schedule Table

Week	To do	worker
Week5(9/27)	Requirement analysis, Defining a role	seung-yun, seong-jun
Week6(10/4)	Service & Development planning	Design chae-won, ji-yong, ji-seop
Week7(10/11)	Midterm Presentation & Peer Review	All teammates
Week8(10/18)	UI/UX design & Graphic Design	chae-won, ji-seop
Week9(10/25)	Collecting Proper image Dataset & Building CNN model	seung-yun, seong-jun
Week10(11/1)	Making Web-based Application	chae-won, ji-yong, ji-seop
Week11(11/8)	Integrating Code & Backend Working	seung-yun, ji-yong
Week12(11/15)	QA Test & Deploy	All teammates
Week13(11/22)	Debugging, code review	ji-yong, seung-yun, seong-jun
Week14(11/29)	Project Documentation & Demo Presentation	seung-yun, chae-won, ji-seop
Week15(12/6)	Final Presentation with the Final Report Peer Review	All teammates

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