



TEAM

# THE OUTSIDERS

*"Capstone Project\_Idea Proposal"*

WORLD



# Agenda

- 00. Team Introduction**
- 01. Project Topic**
- 02. Project Objective**
- 03. Background & Related work**
- 04. Proposed Solution**
- 05. Role & Plan**
- 06. Feedback & comment**

# THE OUTSIDERS

Mathematics

LEE JI SEOP

Mechanical  
Engineering

UHM JI YONG

Political Science  
& Diplomacy

CHE SEUNG YUN

Business  
Administration

JEONG CHAEWON

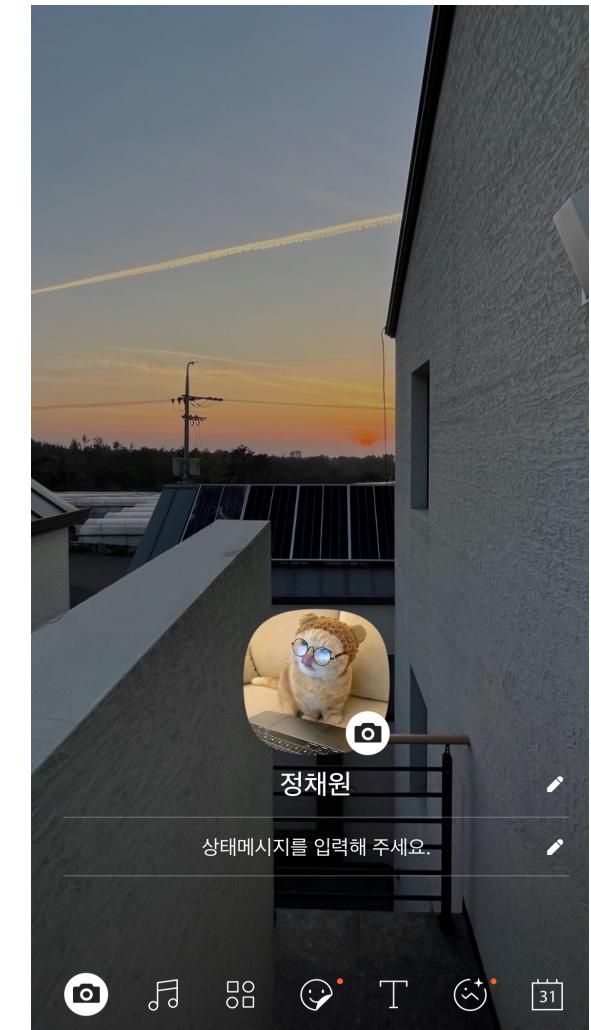
System Management  
Engineering

HONG SEONGJUN



*"5 Different Majors"*

# 01. Project Topic





## How to find the location?

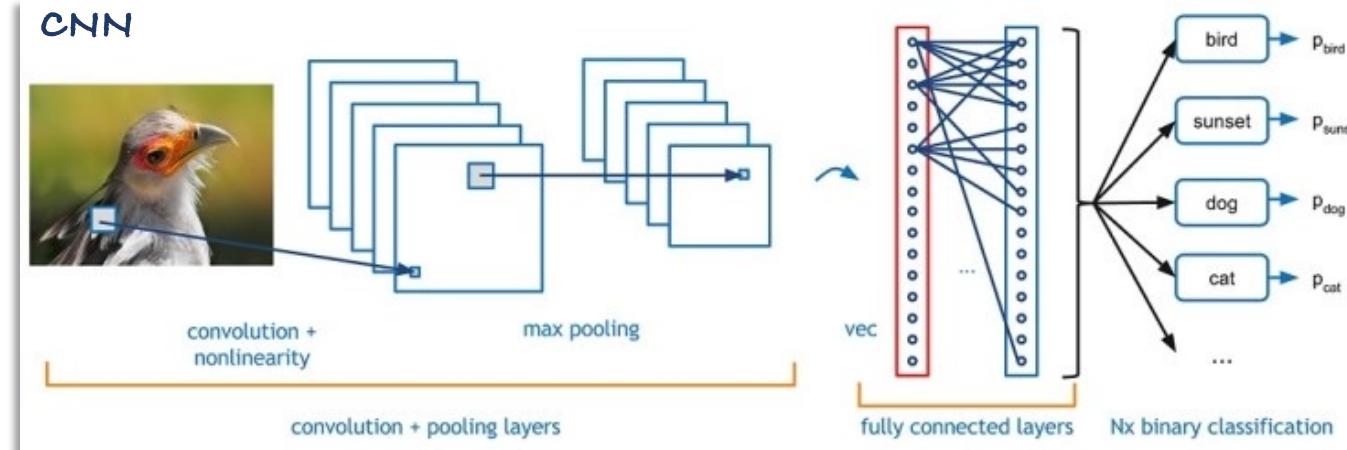
### (1) Use Location Tag



### (2) Use Image Search (like google Image Search)



## 02. Project Objective



**“CNN based location image search and its adaptation to social network”**

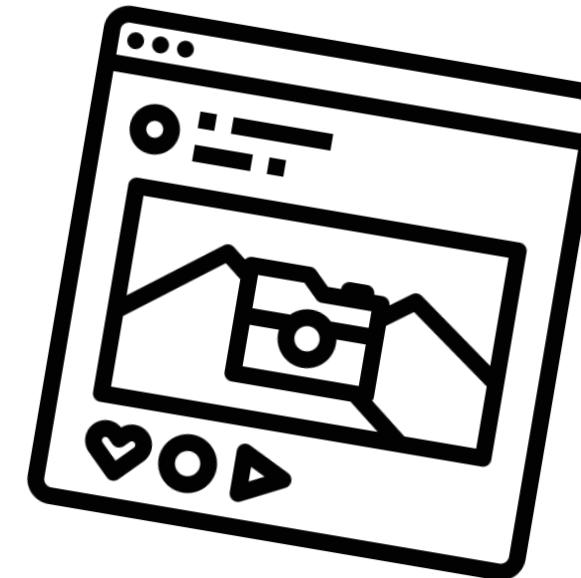


## 02. Project Objective

### “Differentiation of our project”

CNN based place recognition in seoul

Add “posting function” like sns style

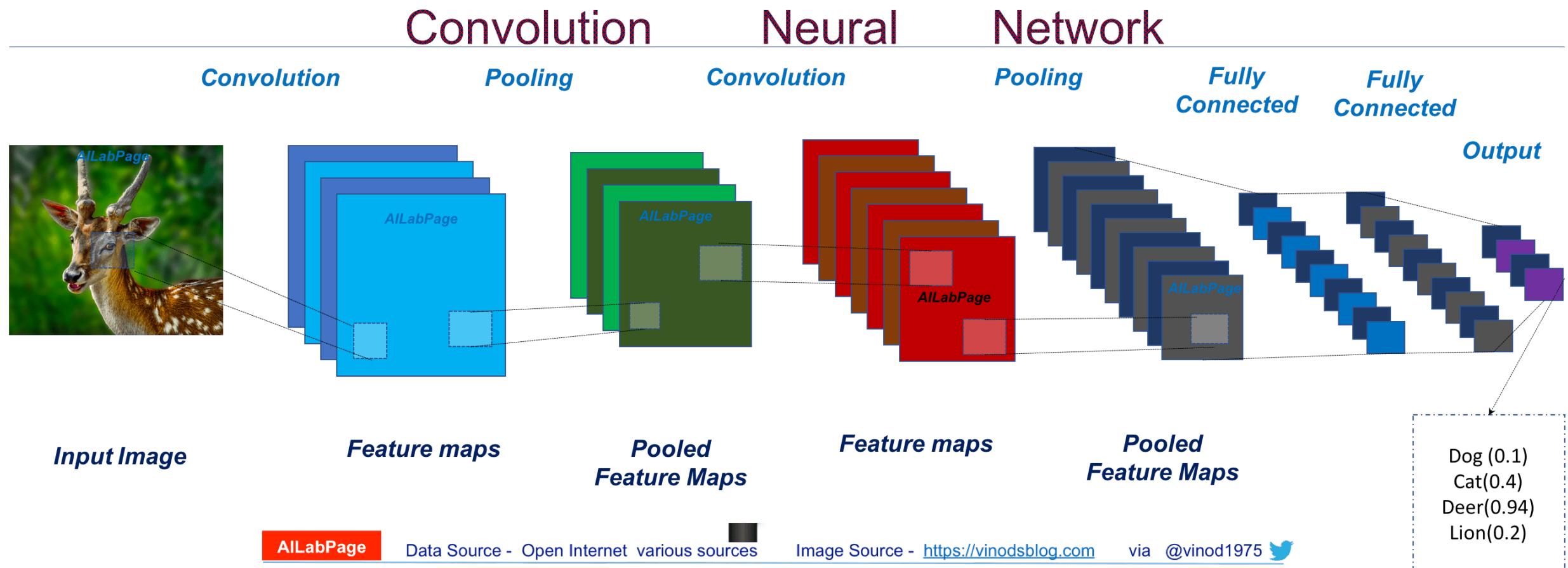


Merits in commercial or tourism  
industry in that region



## 03. Background & Related Work

### # Background



## 03. Background & Related Work

### # Related work

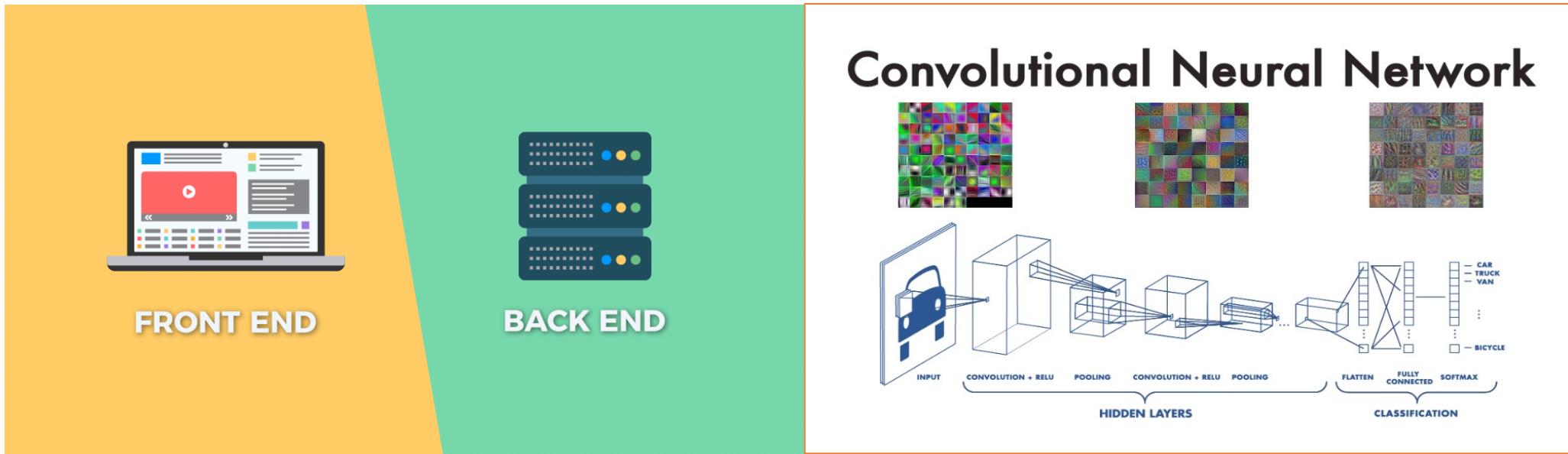


### *Introduction of References*

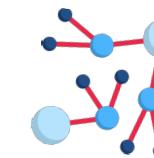
- A. Not CNN : Use binary feature detectors and descriptors
- B. CNN : Rusia's Tourism Application (use VGG16, GoogLeNet, MobileNetV2 )
- C. CNN : Research about Seoul's Landmark (use CNN Resnet101 )

**“CNN based location image search and  
its adaptation to social network”**

## 04. Proposed Solution



**Front End**



**CNN Build**



**Back End**



# front end

# PINPLACE

: CNN based location image search & its adaptation to social network

## Functions

- a. Find place's location (embedded CNN)
- b. List up Hot place (w/ Sorting algorithm)
- c. Uploading data that users have
- d. SNS (w/ Recommendation algorithm)

## Tools



Overleaf

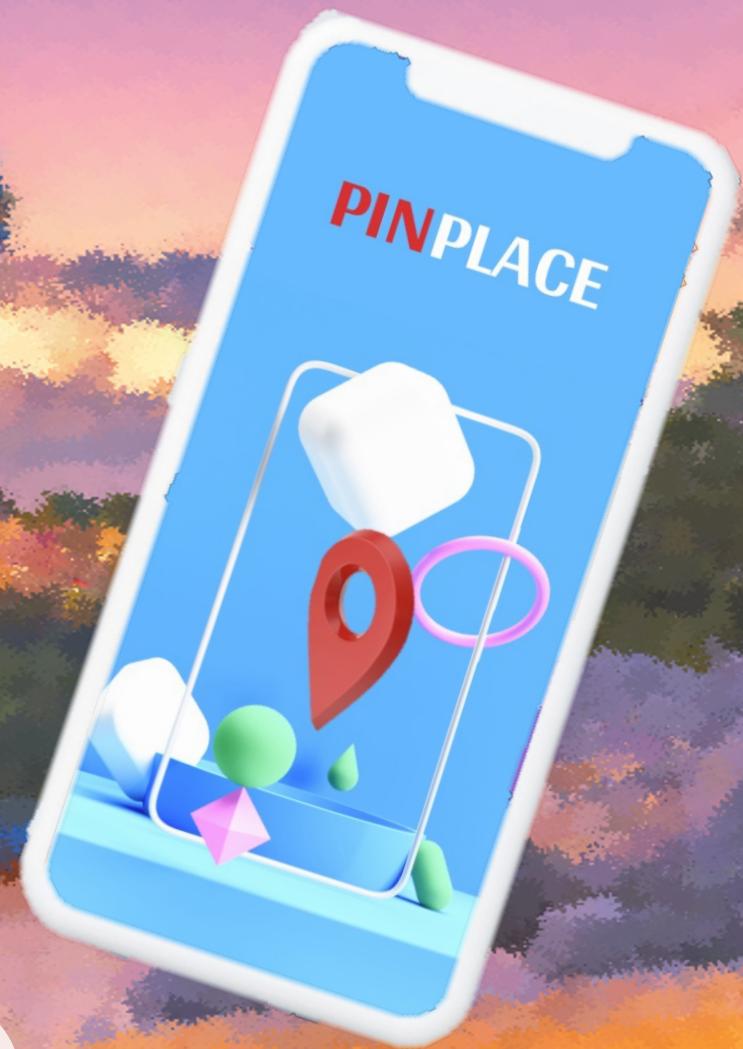


colab

## Stacks



MySQL®

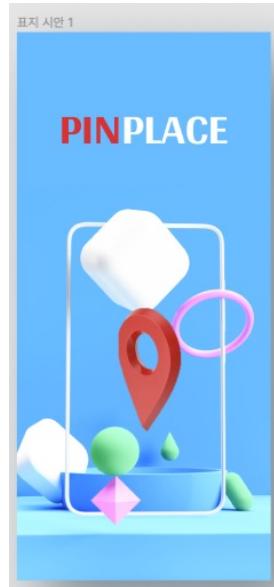


# 04. Proposed Solution

# front end

## UI Design

~ing



표지 시안 1

PINPLACE Find Place Hotplace list Upload SNS Mypage

핫플 리스트

일간 핫플

1 Placeholder Image 노들섬

2 Placeholder Image 밤섬

3 Placeholder Image 선유도

4 Placeholder Image 여의도

이렇게 10위쯤까지 아래로 진행

Placeholder Image 업로드

엔 위에는 대표 이미지가 들어가고, 미 아래는 다른 사진이 첨부됩니다.

SNS 1

SNS 2

Mypage

PINPLACE Find Place Hotplace list Upload SNS Mypage

친구들의 인생 핫플을 구경해보세요

루피 방문하기

루피 방문하기

예시로 리스트업 한 3개 정도만 보여주기

루피 방문하기

루피 방문하기

루피 방문하기

My Best Place

저장한 장소 구경하기 총 10개

저장한 장소 구경하기 총 10개

구형준

저장한 장소 : 5개

저장한 장소 구경하기 총 10개

장소 찾아주는 페이지 1

PINPLACE Find Place Hotplace list Upload SNS Mypage

Where is this place?

Choose Picture

Find Place

장소 찾아주는 페이지 2

PINPLACE Find Place Hotplace list Upload SNS Mypage

Take Photo or Video

Photo Library

Browse

Cancel

Finding Place

만약 사진 나오는데 시간이 꽤 걸리면 gif 밖에서 로딩페이지 만들어주기

장소 찾아주는 페이지 3

PINPLACE Find Place Hotplace list Upload SNS Mypage

Where is this place?

이곳은

성동구 성동1가 서울숲 카페거리입니다.

내 마이페이지에 저장할래요!

풀렸어요! 아닌 것 같아요

업로드

PINPLACE Find Place Hotplace list Upload SNS Mypage

기억해줘요

대\_

대명거리

대학로

사진을 먼저 올릴래요

사진을 올려주세요

사진을 올리면 미리보기를 표출할 것

여기는 어디인가요?

(지도가 들어갈 공간 - OpenLayers?)  
(사진의 EXIF 데이터에 좌표 정보가 있으면)  
(그것을 우선 적용)  
(전 단계에서 장소를 선택해 와도)  
(그 대학적인 위치를 우선 적용)

업로드, 사진 업로드

PINPLACE Find Place Hotplace list Upload SNS Mypage

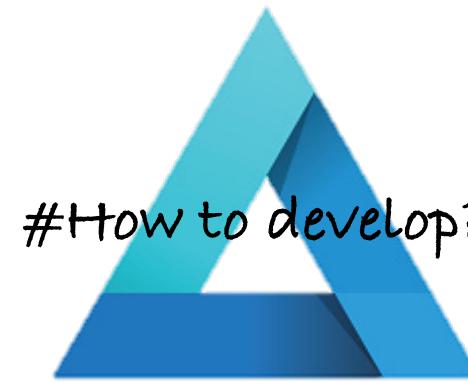
기억해줘요

OK

## 04. Proposed Solution

# CNN Build

### Obtaining Location Information



### Building CNN Model



### Making Web-based Application



## 04. Proposed Solution

# CNN Build

Image dataset

>> Choose 10 hot places in Seoul  
where MZ generation likes



N seoul tower ↗



Naksan park ↗



ickseon  
hanok vilage ↗



The hyundai seoul mall ↗



Jamsil lotte tower ↗

## 04. Proposed Solution

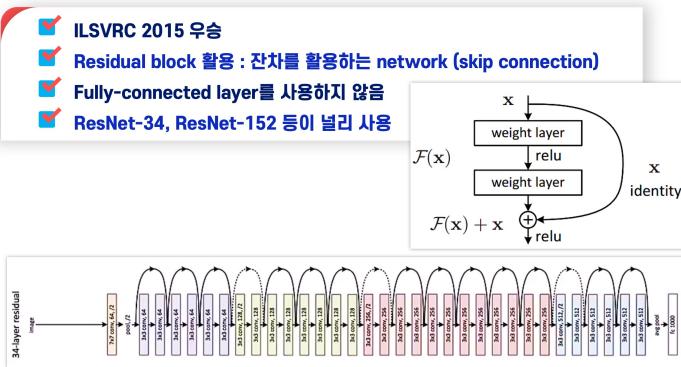
### # CNN Build

#### Obtaining Location image data

- ▶ Collect image data by crawling  
- ▶ Remove noise and duplicate data

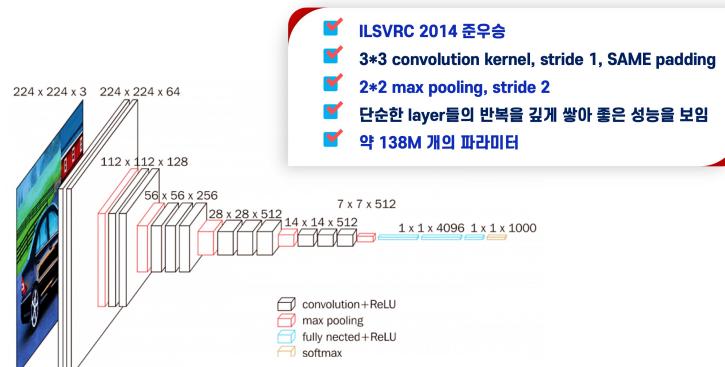
#### CNN Model

##### Famous CNN Architecture : ResNet



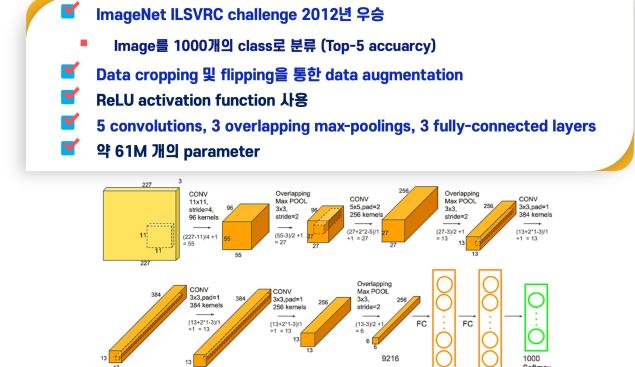
ResNet

##### Famous CNN Architecture: VGG-16



VGG-16

##### Famous CNN Architecture: AlexNet

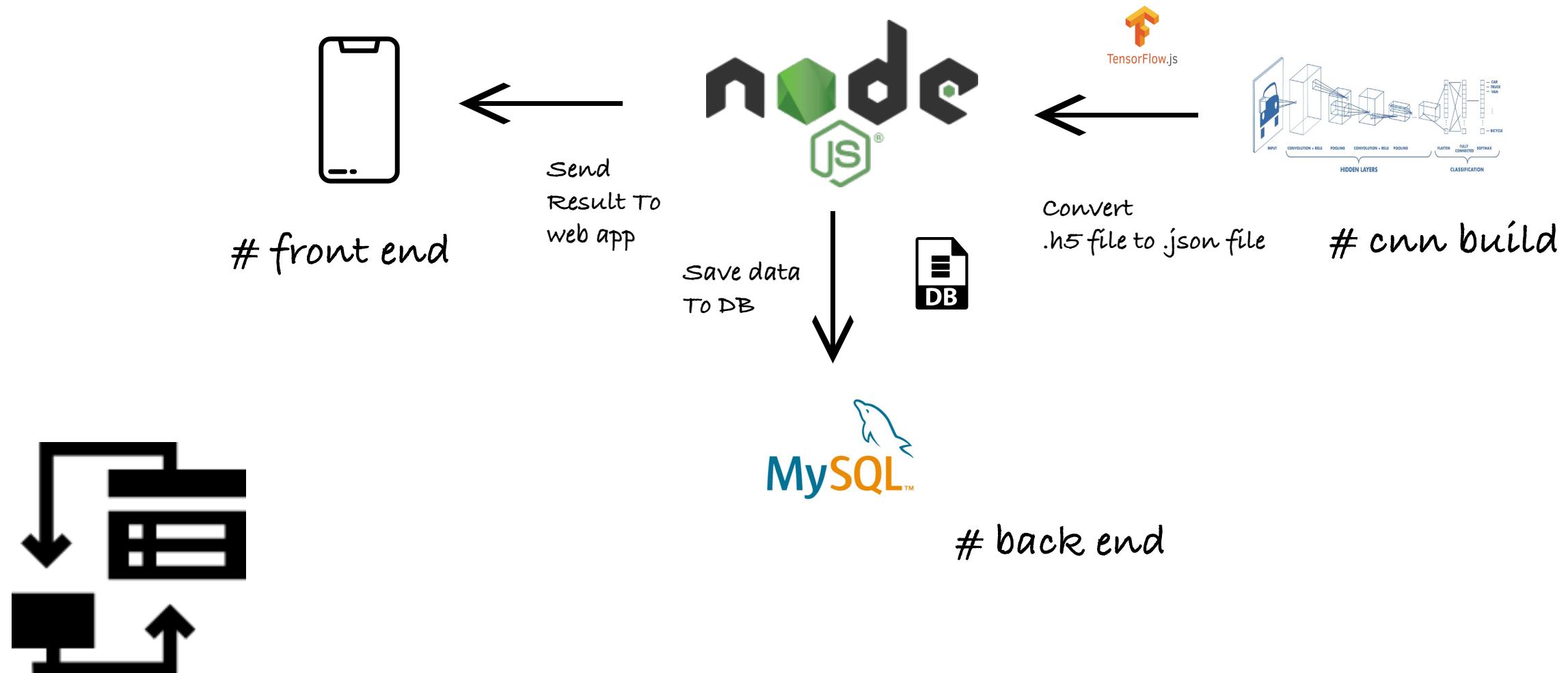


AlexNet



## 04. Proposed Solution

# Back end



### Role distribution



**LEE JI SEOP** : web programing in hot place list pages and pages about collecting images from users.

**JEONG CHAEWON** making UI and web programing in main pages, CNN implementation pages and posting pages.

**UHM JI YONG** : backend such as establishing DB and server, connecting CNN models into web app.

**CHE SEUNG YUN** : image pretreatment, building CNN models and test them and comparing performance.

**HONG SEONG JUN** : collecting images from google and Instagram by crawling and then searching CNN models and helping CNN building.

## 05. Role & Plan

### Plan & schedule

Week5(9/27~) Requirement analysis, Defining a role - seung-yun, seong-jun

Wekk6(10/4~) Service & DevelopmWekk6(10/4~) Service & Development planning - Design chae-won, ji-yong, ji-seop ent planning

3. Collecting Proper image Data set & BuildinWekk7(10/11~) Midterm Presentation & Peer Review - chae-won, seung-yun, ji-yong, ji-seop, seong-jun

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 - chae-won, seung-yun, ji-yong, ji-seop, seong-jun

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 - chae-won, seung-yun, ji-yong, ji-seop, seong-jun

## 06. Feedback & comment

Can you think of additional features?



We think of social networking features. We can provide place recognition services and user can post that picture which the user wants to know. Then, another people can comment that posting. For instance, someone can comment like “a restaurant near that place is famous!”.



We provide list up service which can list the hot places ordered by popular ones. We can use sorting algorithm to list places using hits.



We can collect pictures from users for another places. Then we updated model so that we can provide another place. we will provide this service.

## 06. Feedback & comment

Can you clarify why we need this service other than GPS?



GPS is a global positioning system. The proposed service is a categorization system based on pictures of locations.

The proposal is about to find a location; but it looks a simple image classification problem



This is a location finder based on image classification, but this won't be a simple work. A sophisticated image classifier like Google Image Search can detect dogs in diverse postures and classify as dogs, regardless what posture one is in. Likewise, photographs taken in the same place may look quite different for many reasons. That is the reason we think this will not be a simple task.

Can you clarify if you leverage location information (page 13) from other resources into determining a location? If so, how does it help when building a model?



As there is temporal limitation, we cannot take sufficient number of photographs (as training dataset) we need. We will select locations and obtain photographs taken on those selected locations from public datasets, and from Google and Instagram (by web data extraction). By using collected data, we will build a CNN-based location finder model with TensorFlow and Keras.

## 06. Feedback & comment

Hot places with a sorting algorithm lead to change rankings (page 12 in the slides).

Then you should rebuild the model each time?



CNN model is still same. However, list model will be rebuildded. So, we have to update that list. We think of monthly list up service.

There are people who do not want to disclose their locations for privacy



There would not be any privacy problem. Because our project is to give the location of picture users want to know. We never contact their locations.

How do you recognize pictures in the same place, but looking quite different?



The CNN model extracts features from the trained images and classifies the given inputs based on them. In order to classify photos that look different from the same place, there may be a way to extract more features by collecting enough image data for a specific place.

## 06. Feedback & comment

Is this approach expandable by design? In Seoul, maybe we have hundreds of well-known places. Can the proposed technique have a good performance when classifying such a large number of labels?



We decided to create high-performance items even in a small area because we thought it was impossible to cover all the world data for a limited period of less than 4 months. So we will learn data from Seoul to 10 hot places during this semester and continue to expand the places we support. In the service, a design that directly obtains data on the beta area from a user also implies the possibility of service expansion.

Does Russia's tourism application employ three models at the same time?

Or did they make a comparison between those models?



They tried out all three and compared the performance. GoogLeNet actually had the better performance however as the NN was supposed to run in Mobile devices they made a compromise to work with MobileNetV2 instead.

## Reference

- 2020 20th International Conference on Control, Automation and Systems (ICCAS 2020) Oct. 13~16, 2020; BEXCO, Busan, Korea
- O. S. Laptev and I. I. Bikmullina, "Sightseeing Application Based on Location Marking and Convolutional Neural Network Building Recognition," *2020 International Russian Automation Conference (RusAutoCon)*, 2020, pp. 209-214, doi: 10.1109/RusAutoCon49822.2020.9208062.
- Journal of The Korea Society of Computer and Information Vol. 25 No. 9, pp. 31-36, September 2020
- 이윤아, 낭종호 (2018). 서울 랜드마크 인식을 위한 학습 이미지 데이터셋 구축 및 CNN을 이용한 인식 실험. 한국정보과학회 학술 발표논문집, 845-847

THANK YOU :)