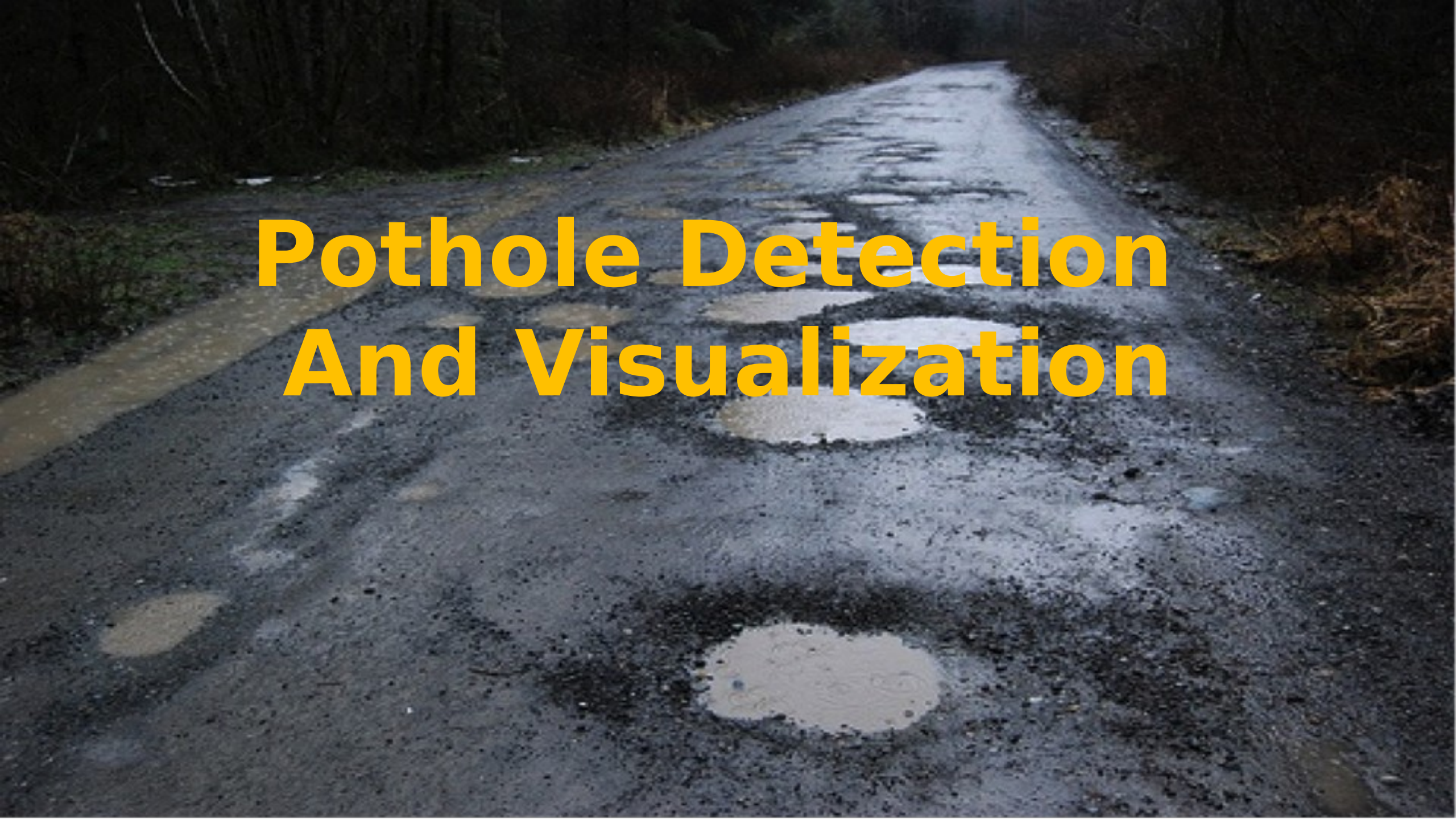
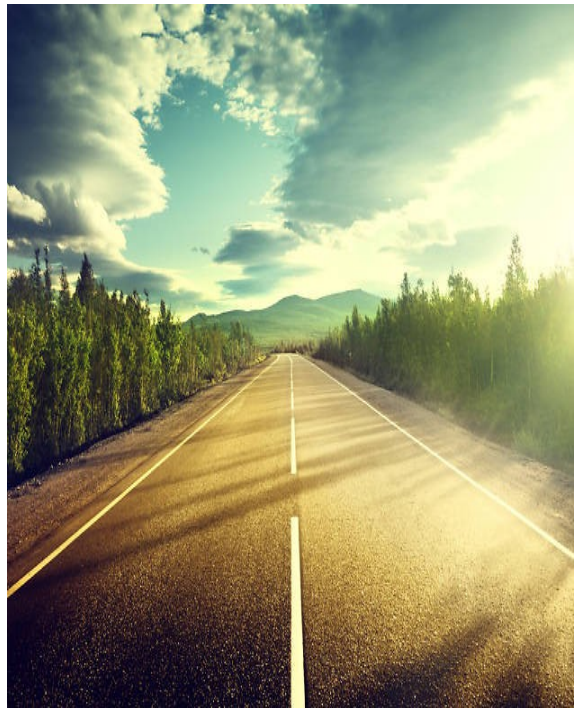
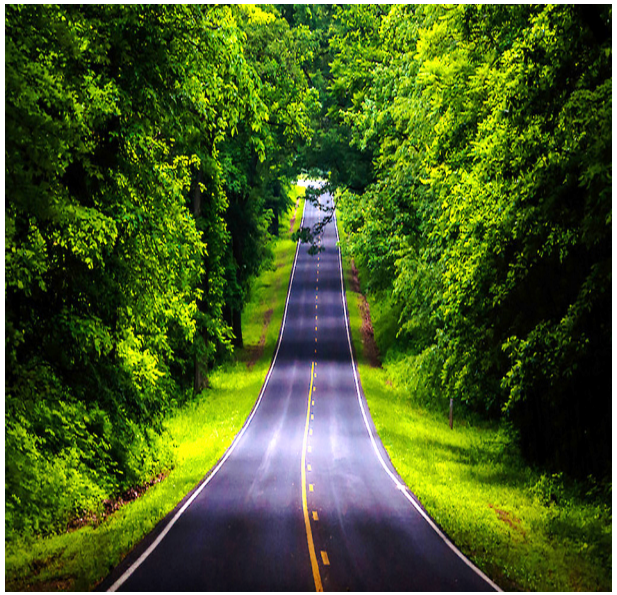

Pothole Detection
And Visualization

About Me

- I am a 3rd year Undergraduate Student at UCET, Bikaner, currently known as Bikaner Technical University(BTU).
- I am pursing my B.Tech degree in Computer Science and Engineering.
- Skills
  - Deep Learning
  - Artificial Neural Network
  - Machine Learning
  - Data Science
  - GUI with Python and Java

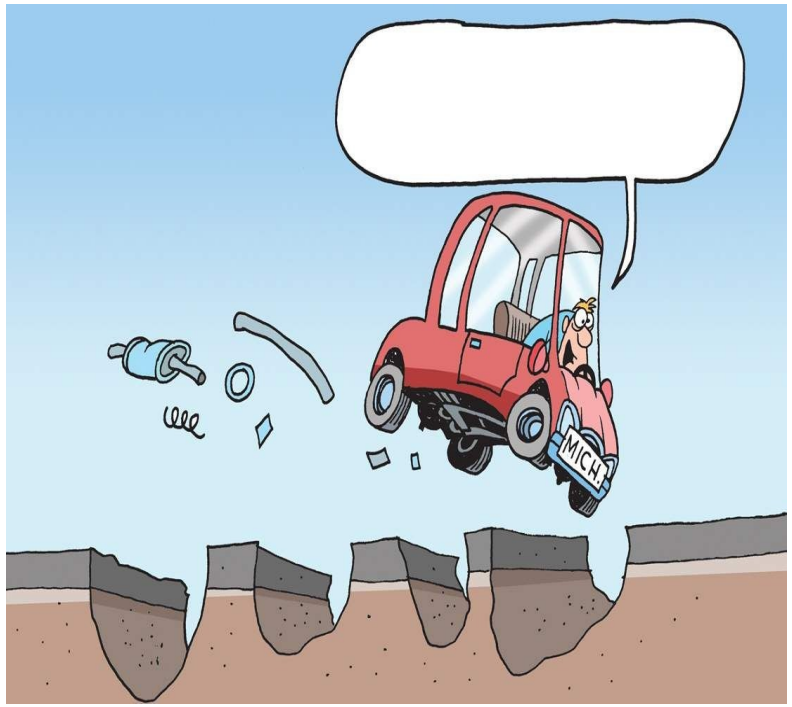
Kind of Roads we Like





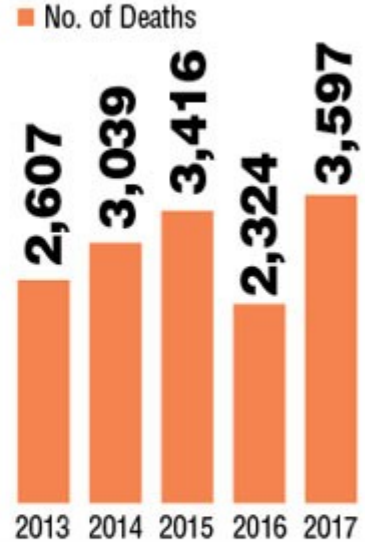
Kind of Roads we Hate

Road Accidents due to Potholes



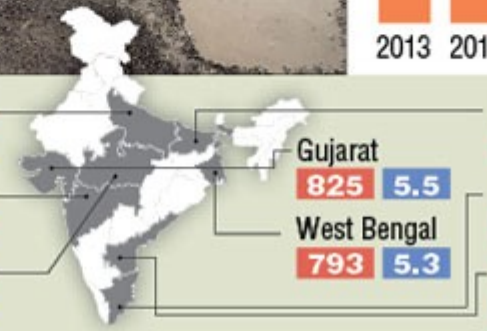
DEADLY POTHOLES OF THE COUNTRY

ROAD ACCIDENT DEATHS MORE THAN FATALITIES CAUSED BY TERRORIST ATTACKS IN INDIA



STATES WITH HIGHEST NUMBER OF DEATHS IN 5 YRS

■ No. of Deaths
■ %age of total deaths



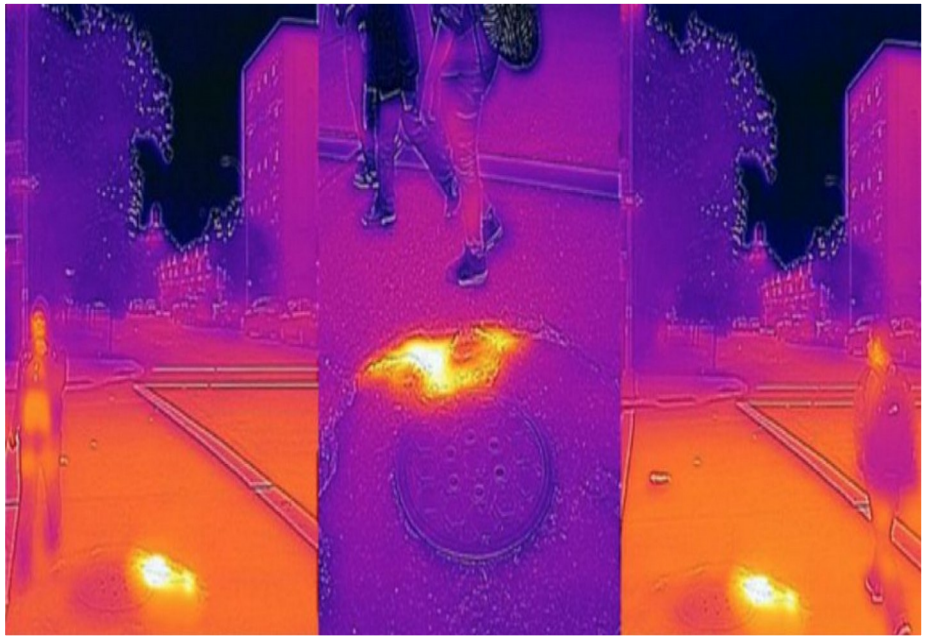
	No. of Deaths	%age of total deaths
Uttar Pradesh	4,415	29.6
Maharashtra	2,136	14.3
Madhya Pradesh	1,385	9.3
Gujarat	825	5.5
West Bengal	793	5.3
Bihar	775	5.2
Tamil Nadu	654	4.4
Andhra Pradesh	605	4.0

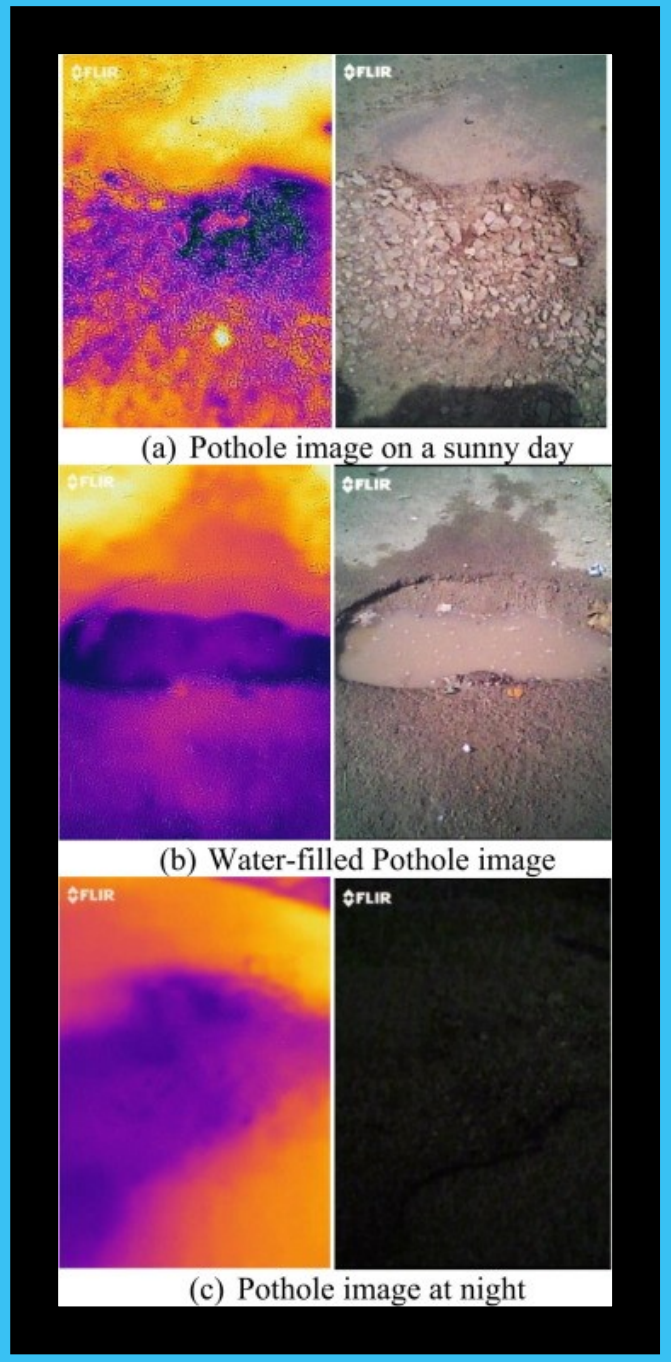
Techniques for Pothole Detection

Mainly there are three main techniques:-

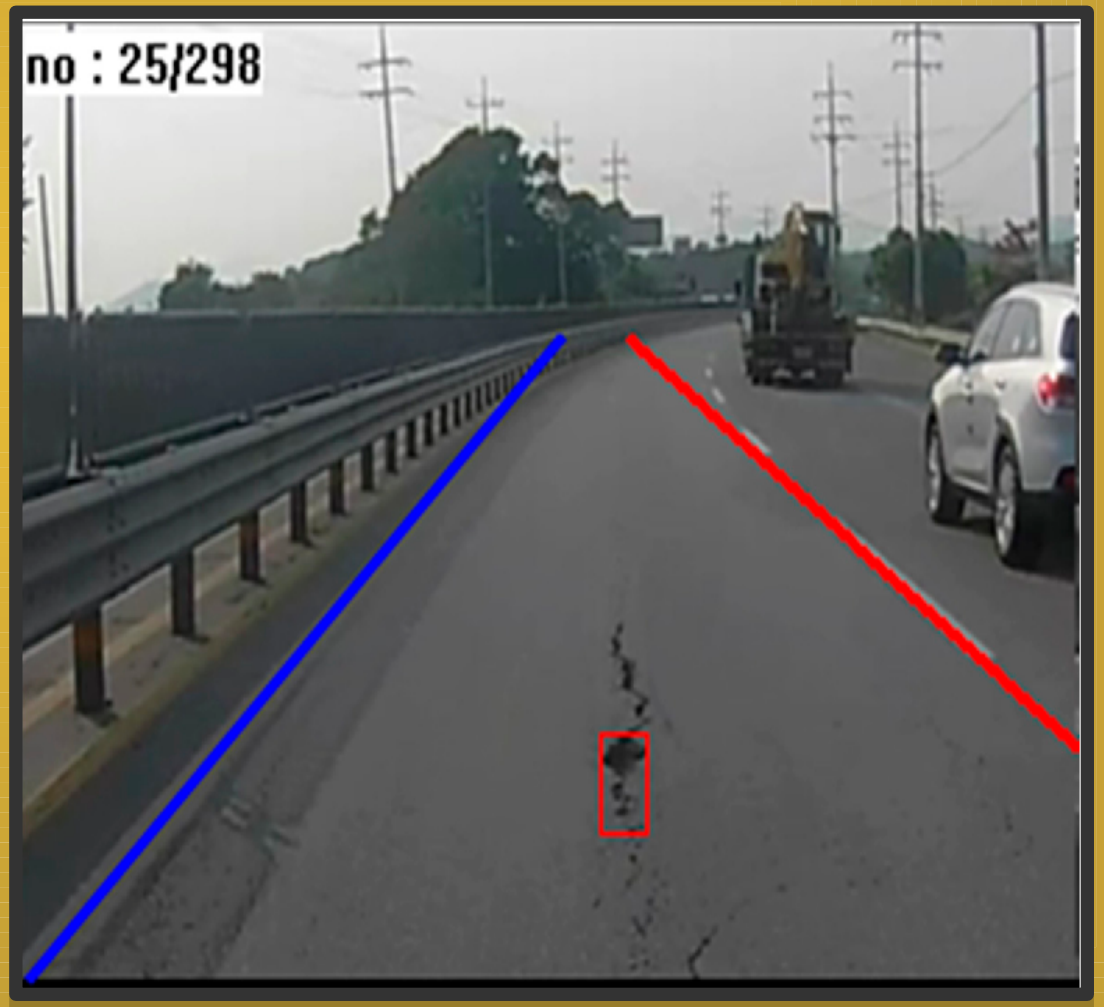
- Thermal Imaging
- Image Processing and CNN
- Sensor Detection

1. Thermal Imaging

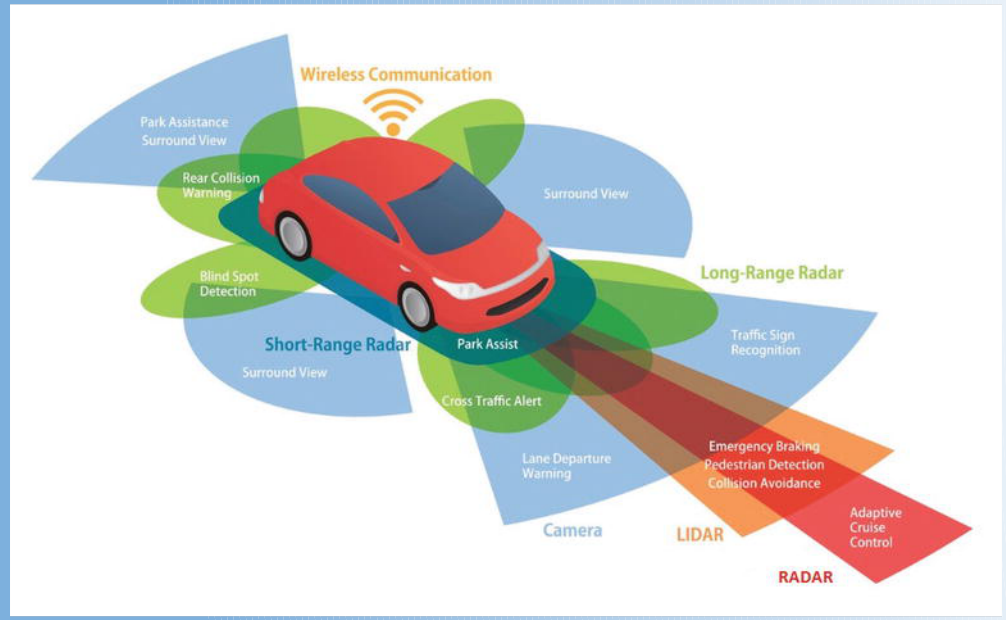


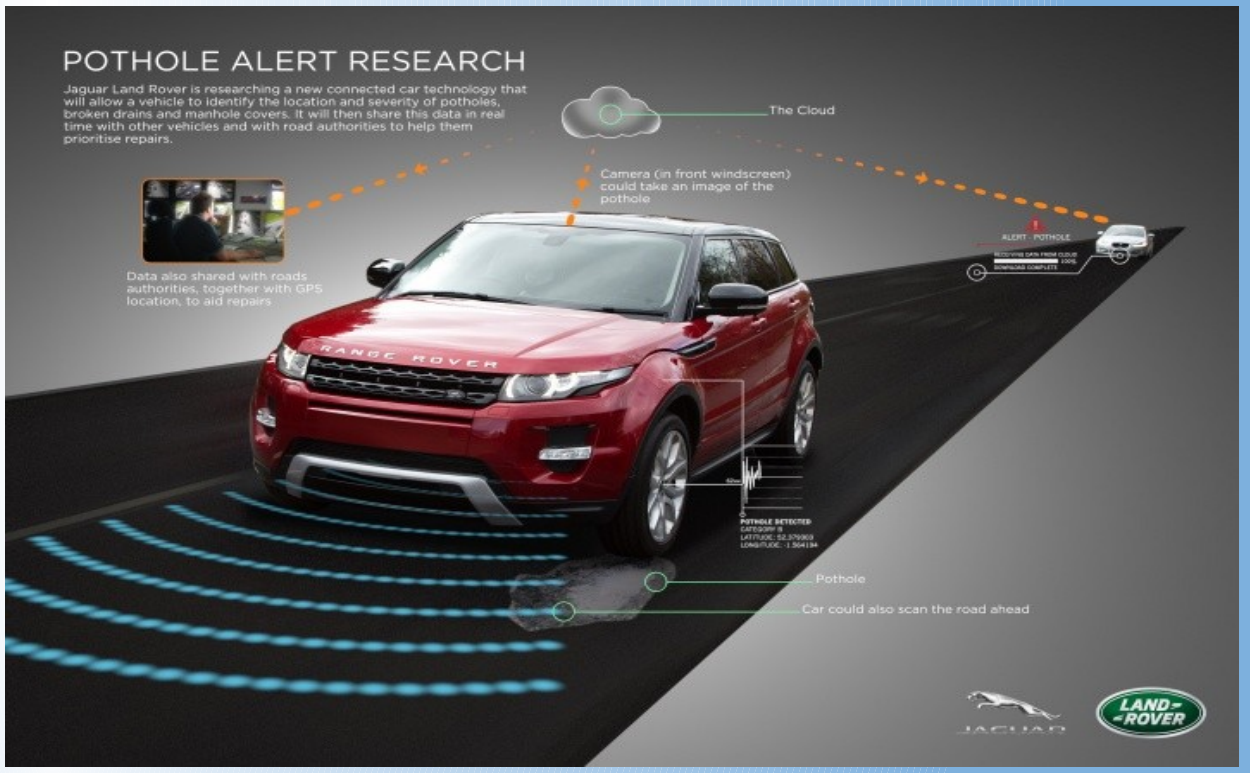


2. Image Processing and CNN



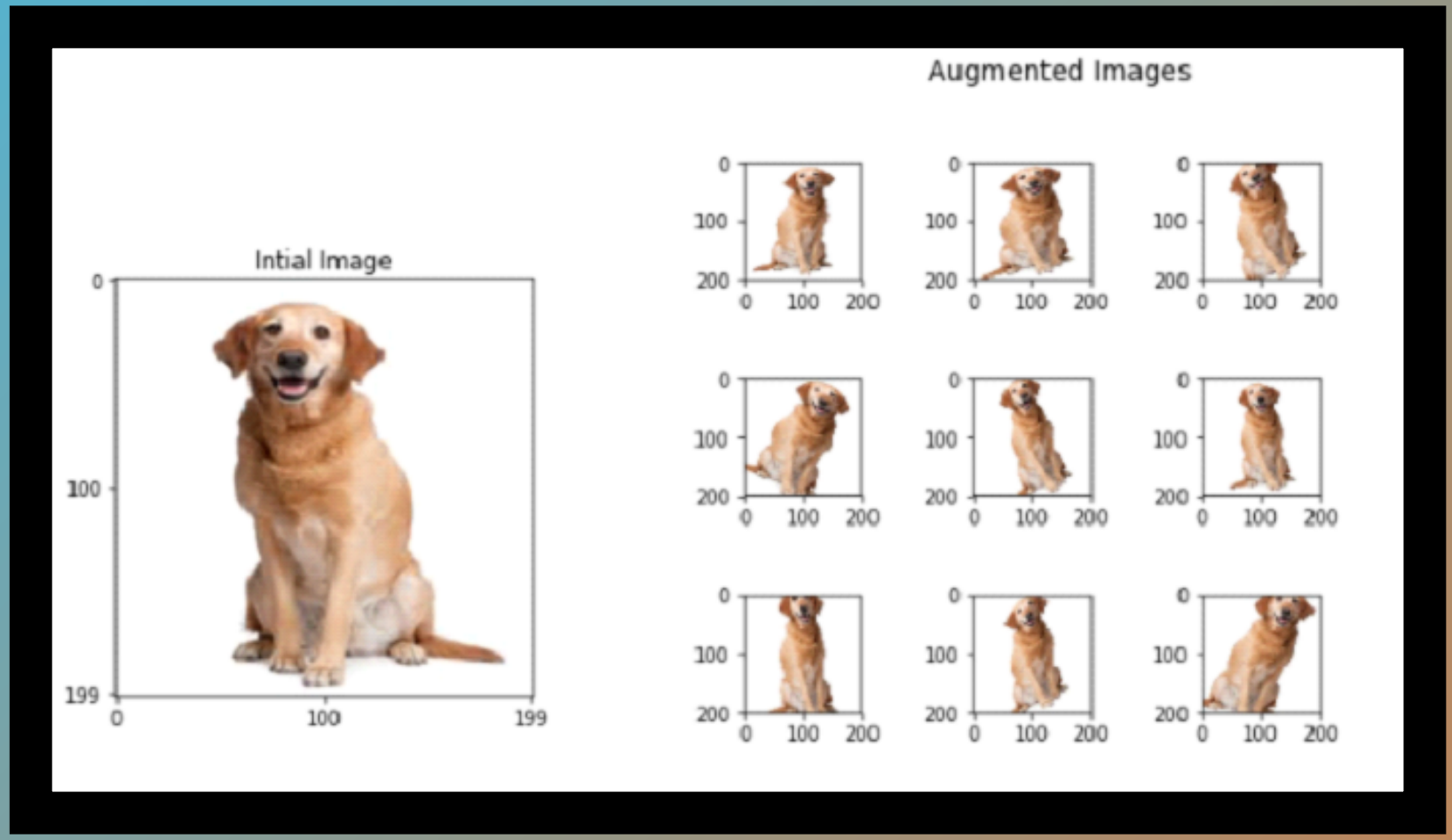
3. Sensor Detection



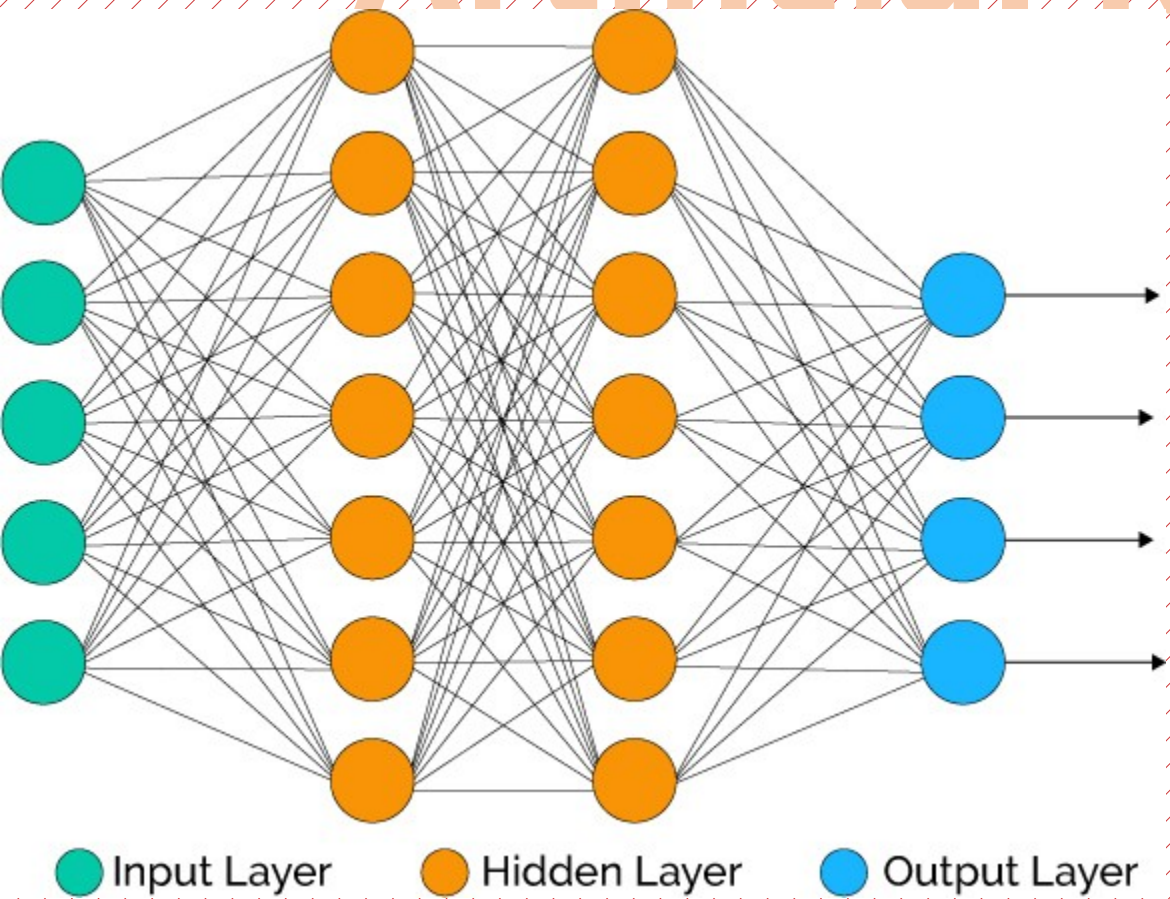


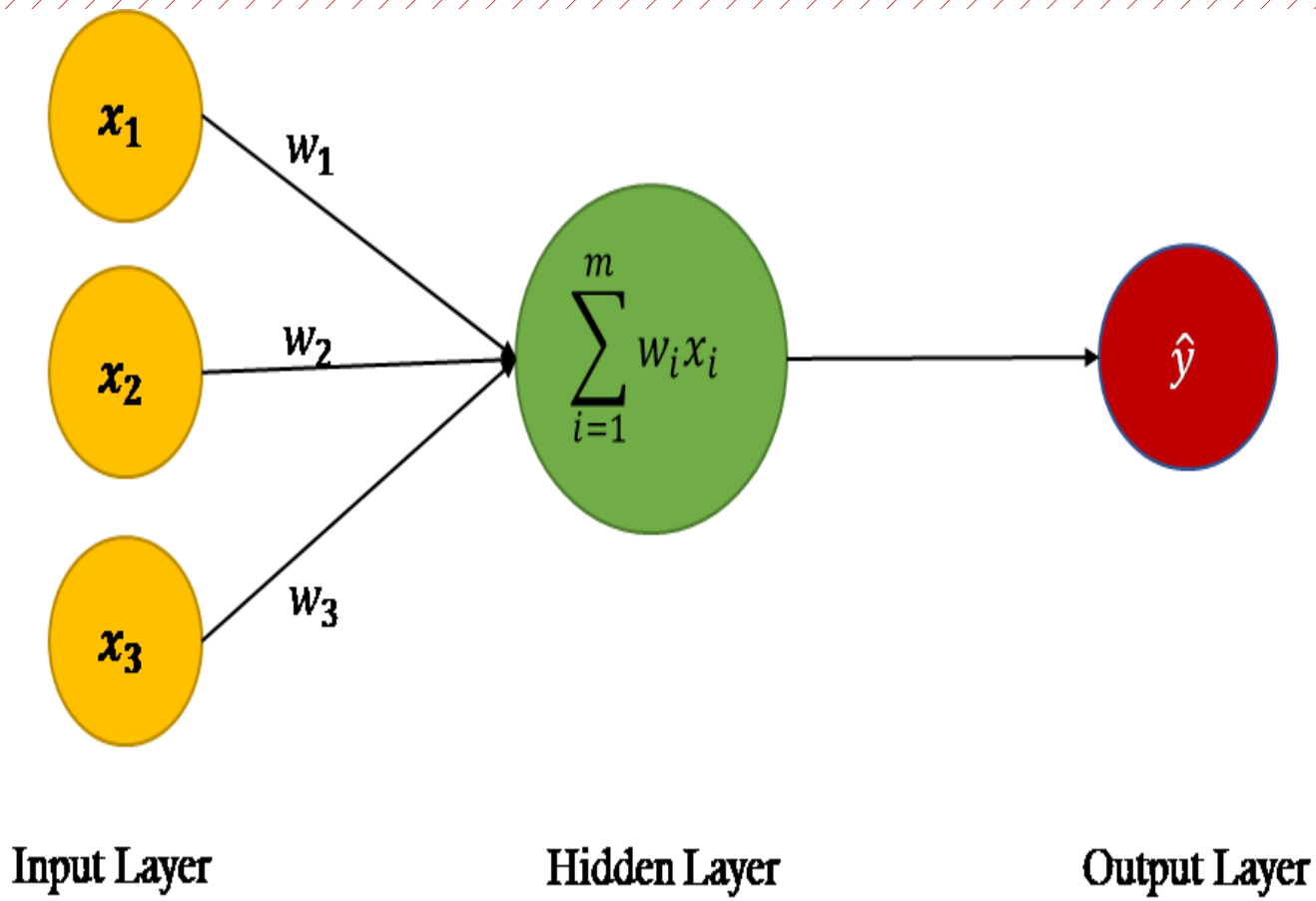
Any Incident that Triggered this idea

Image Augmentation

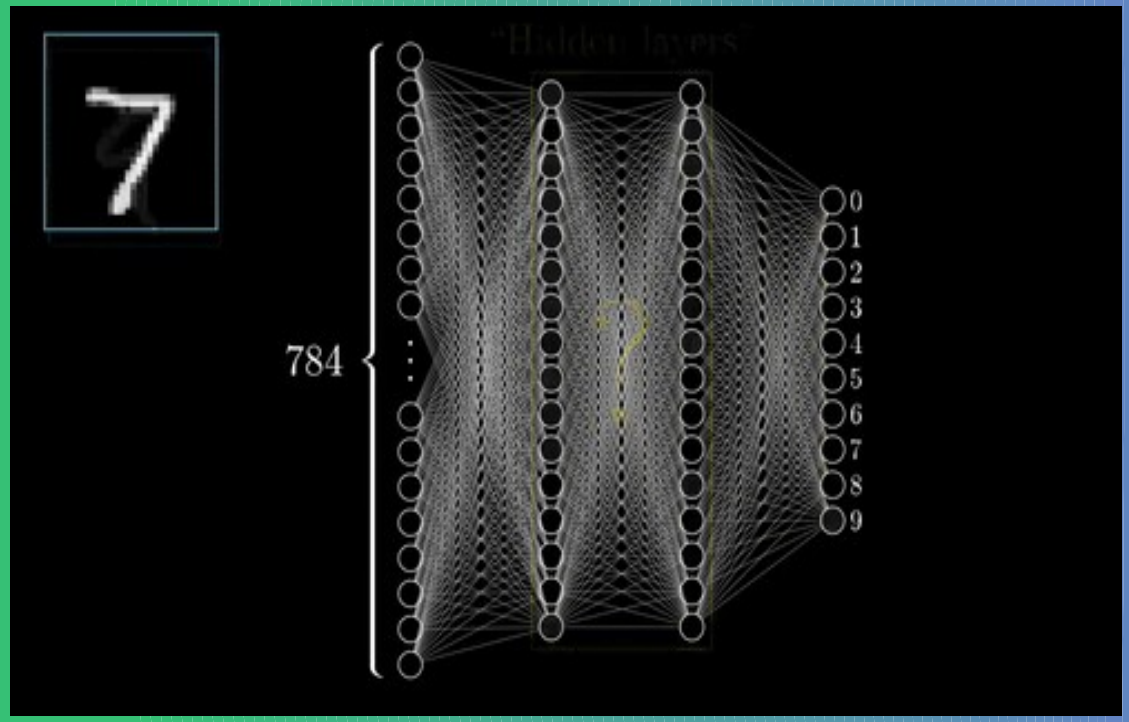


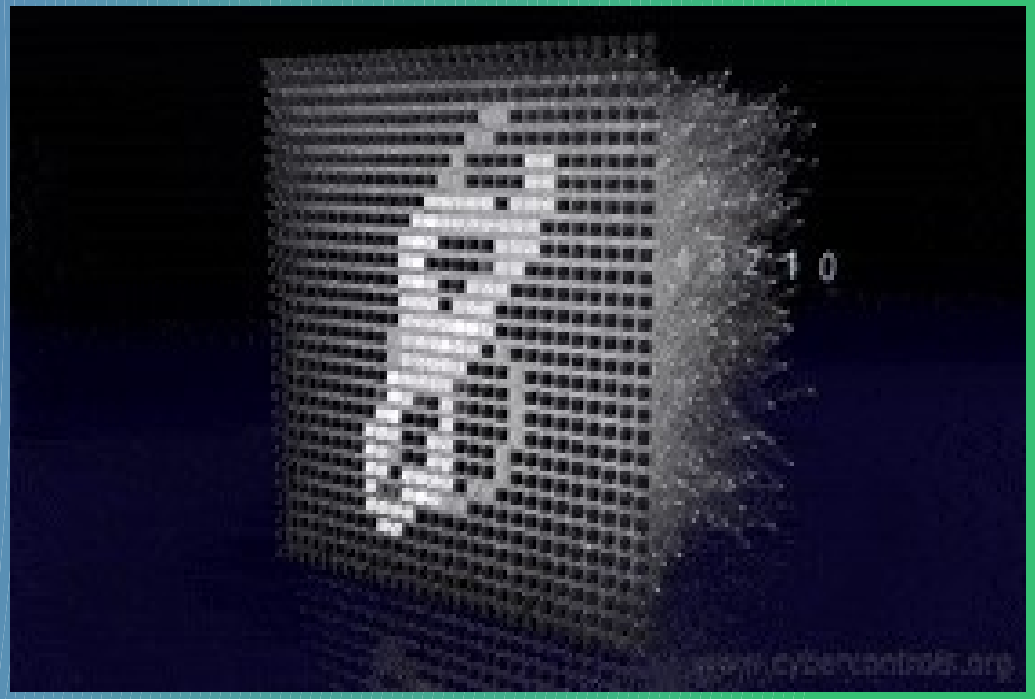
Artificial Neural Network



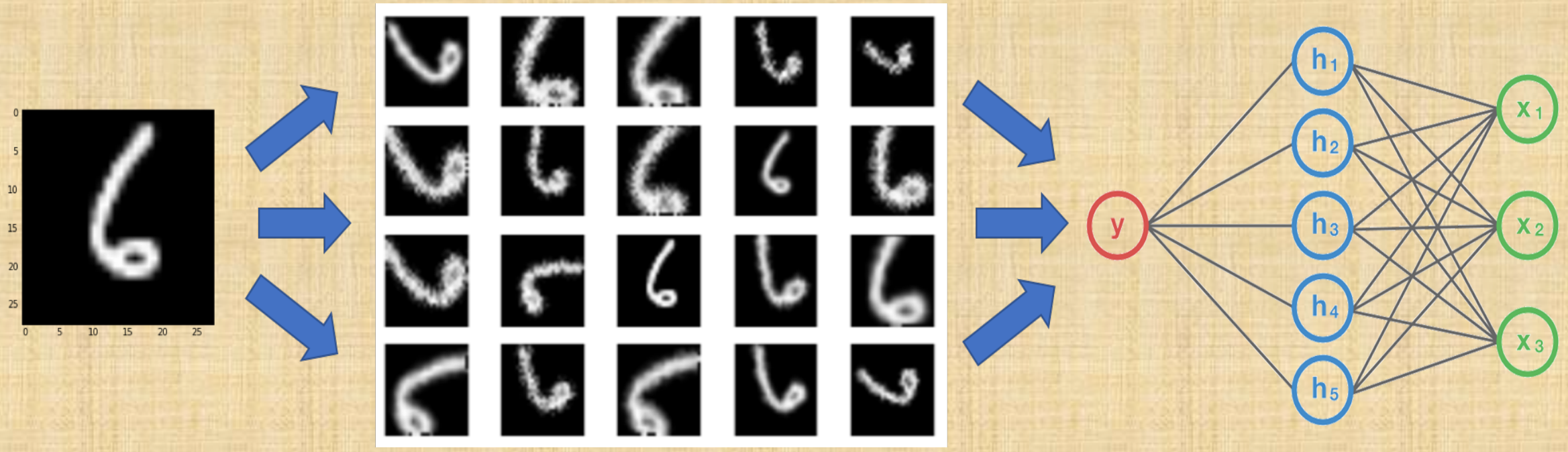


Convolutional Neural Network





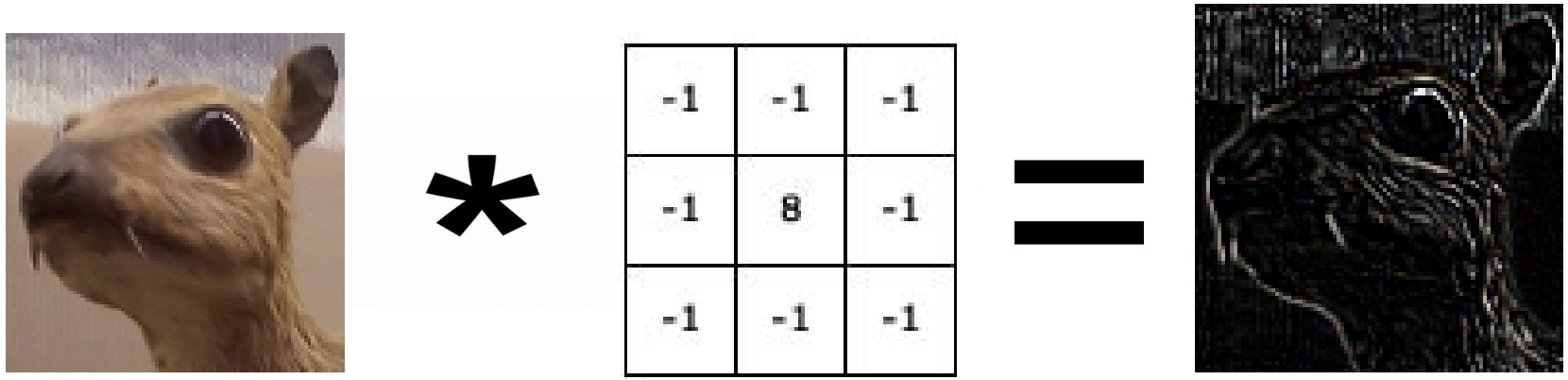
Working:



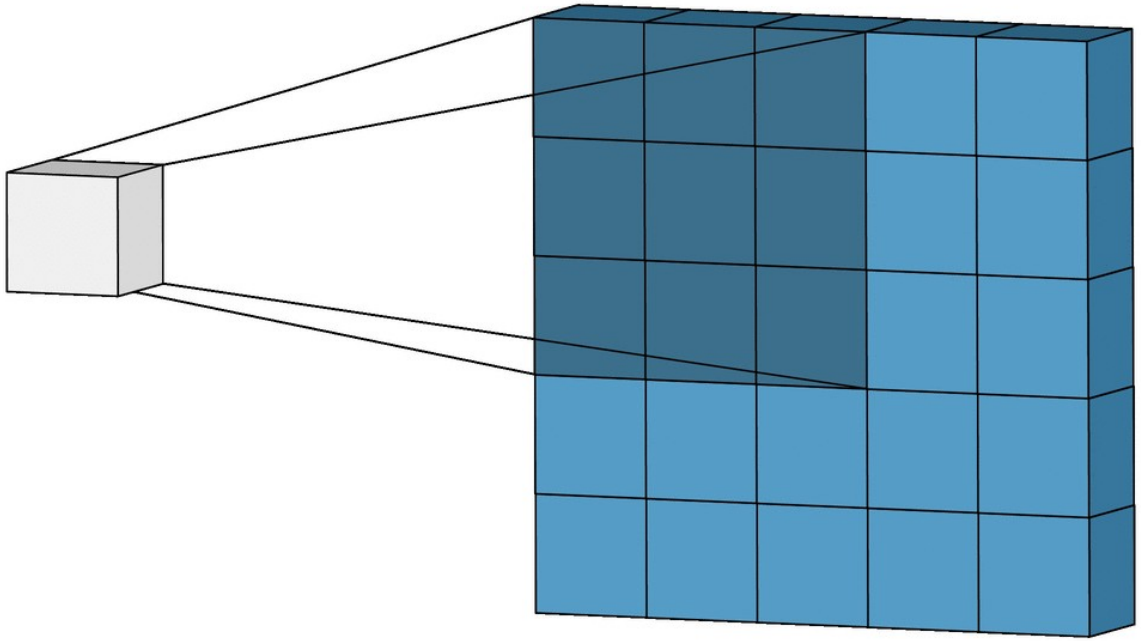
Kernel

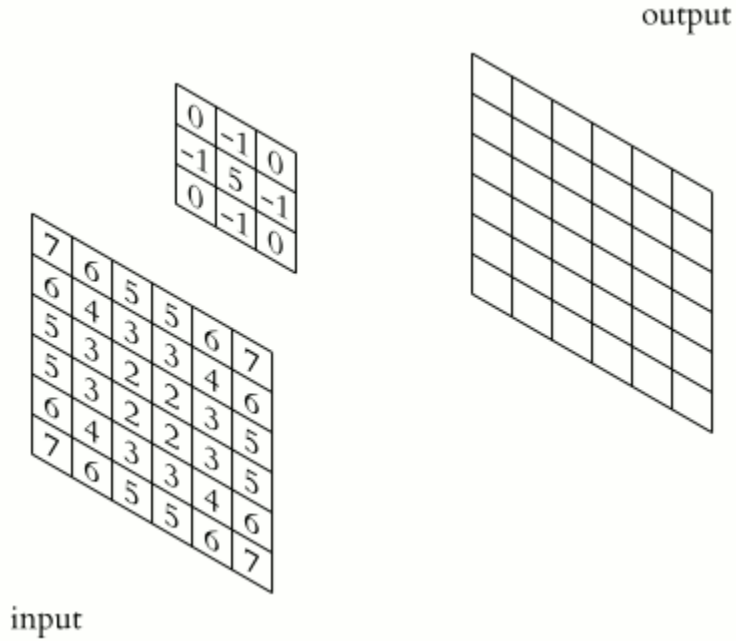
- In image processing, a **kernel**, **convolution matrix**, or **mask** is a small matrix. It is used for blurring, sharpening, embossing, edge detection, and more. This is accomplished by doing a convolution between a kernel and an image.
- The general expression of a convolution is:

$$g(x,y)= w*f(x,y)$$

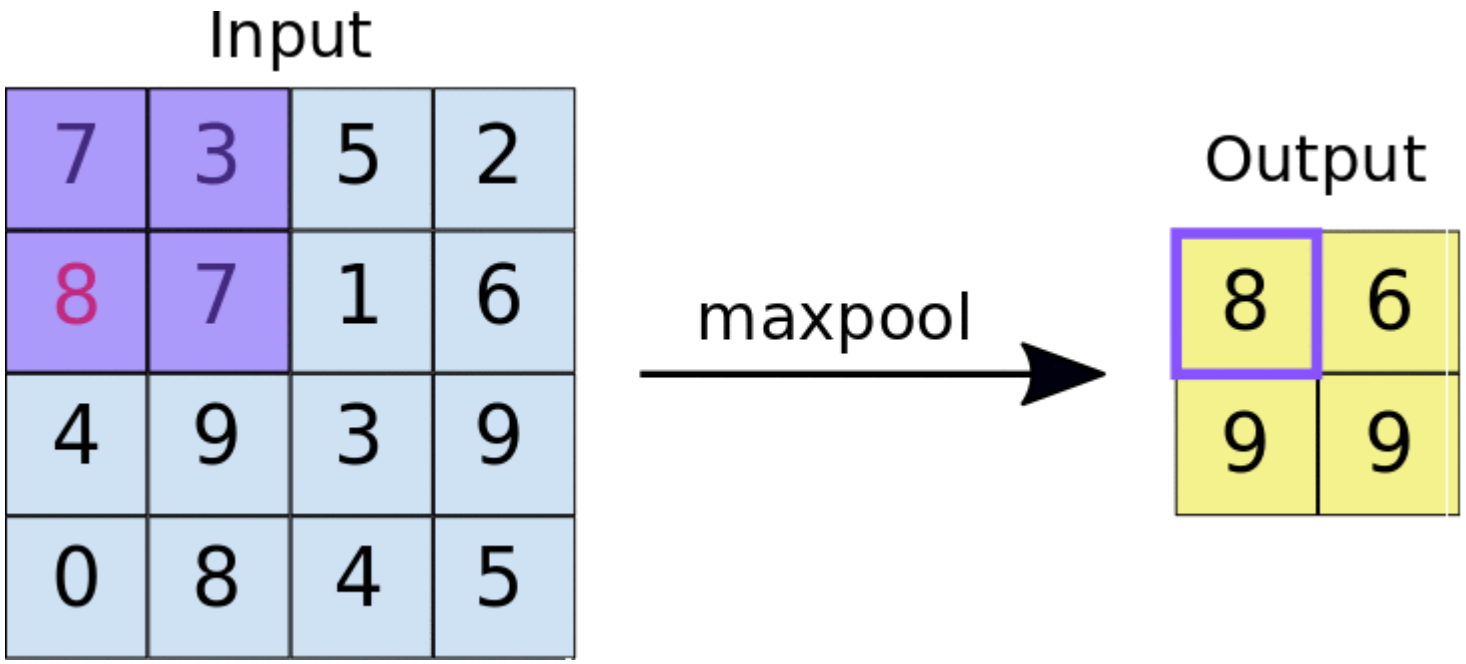


Convolutional 2D

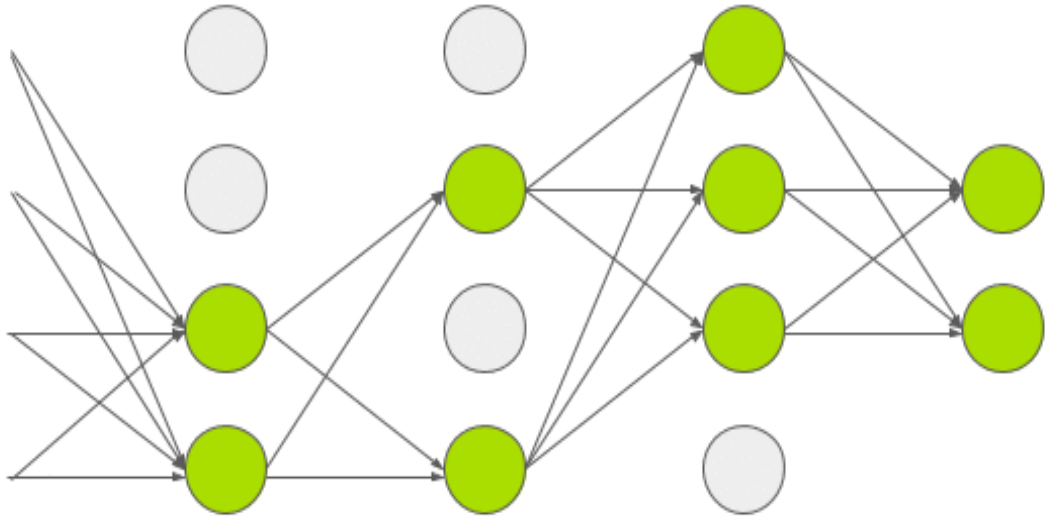


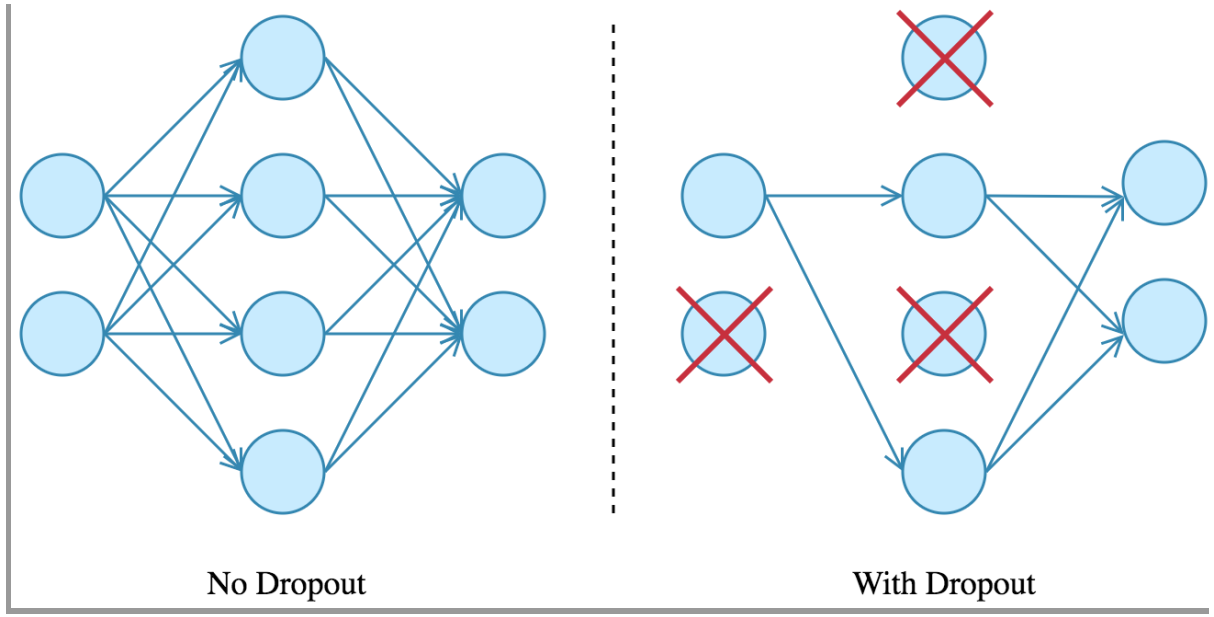


MaxPooling



Dropout

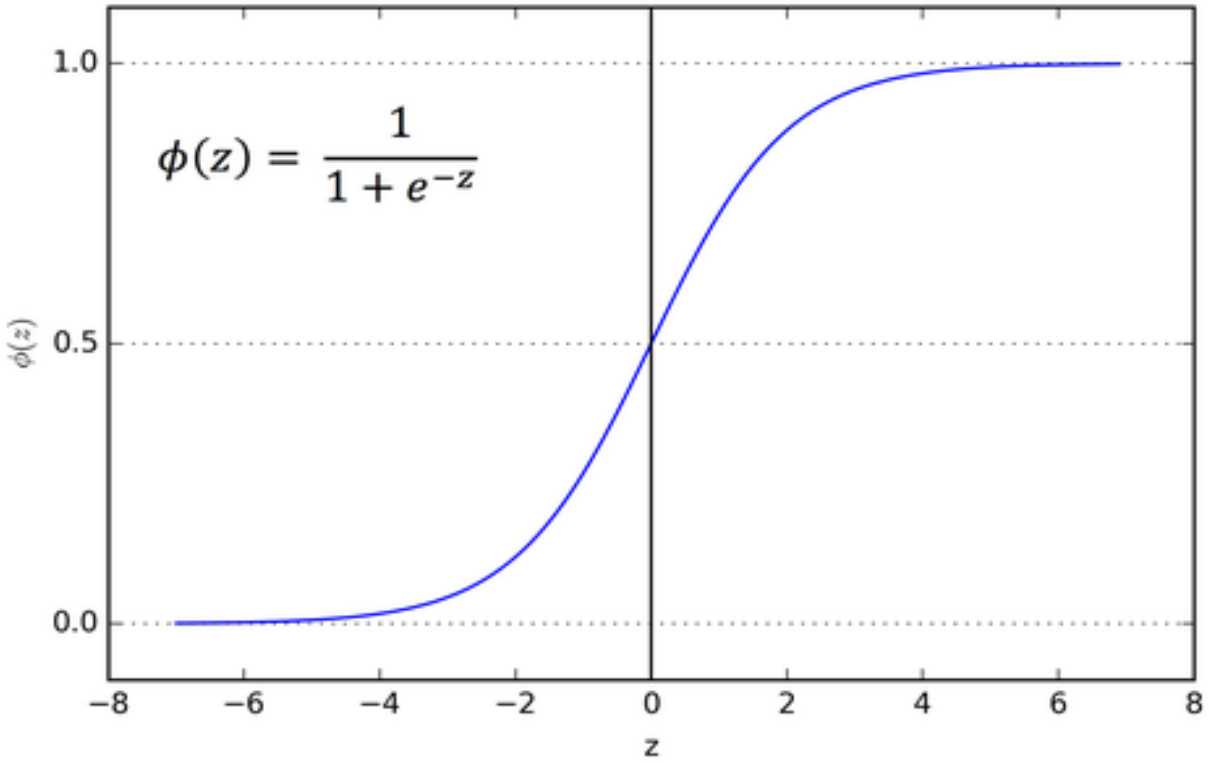




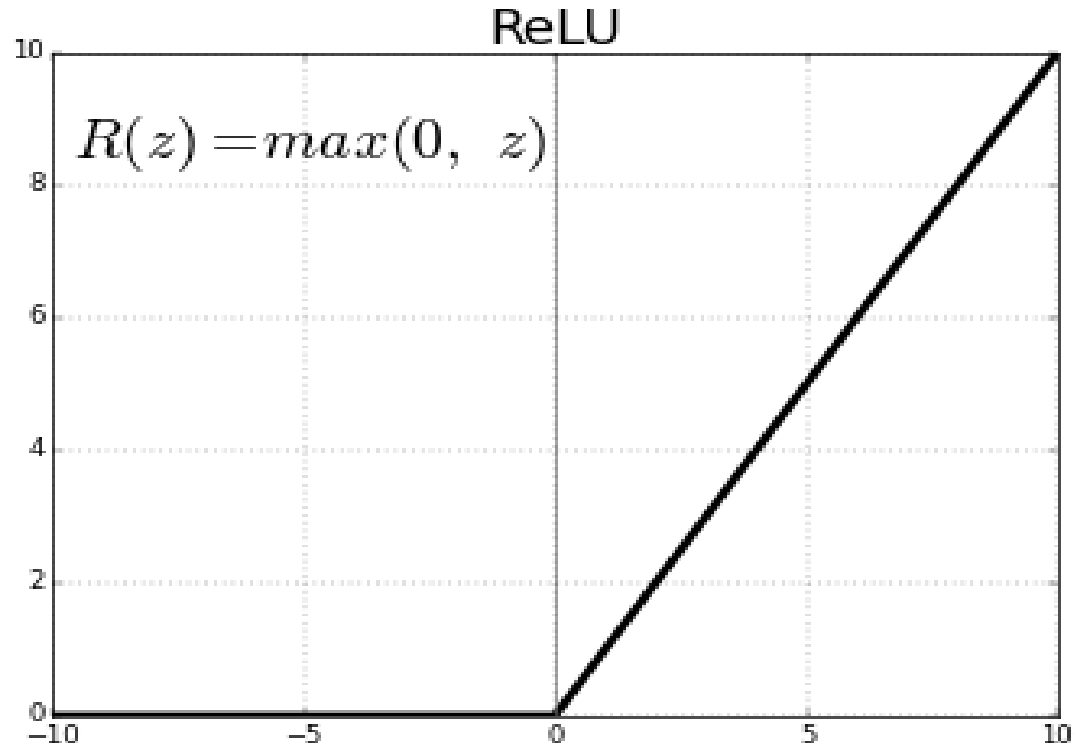
Activation Function

- The activation function is the non linear transformation that we do over the input signal. This transformed output is then sent to the next layer of neurons as input.
- Names of Activation Function:
  - ❖Sigmoid Function
  - ❖Tanh Function
  - ❖ReLU Function
  - ❖Leaky ReLU Function
  - ❖Maxout Function
  - ❖ELU Function
  - ❖Softmax Function

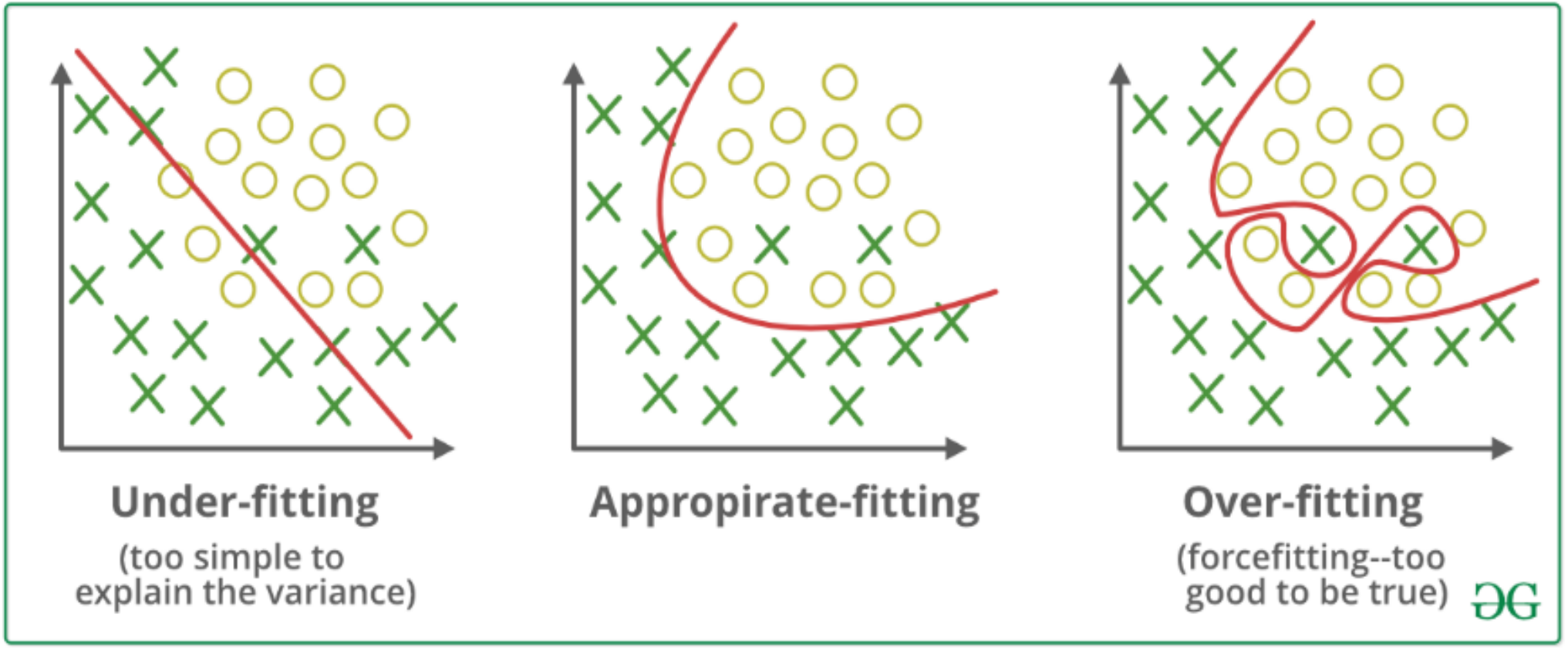
Sigmoid Function



ReLU



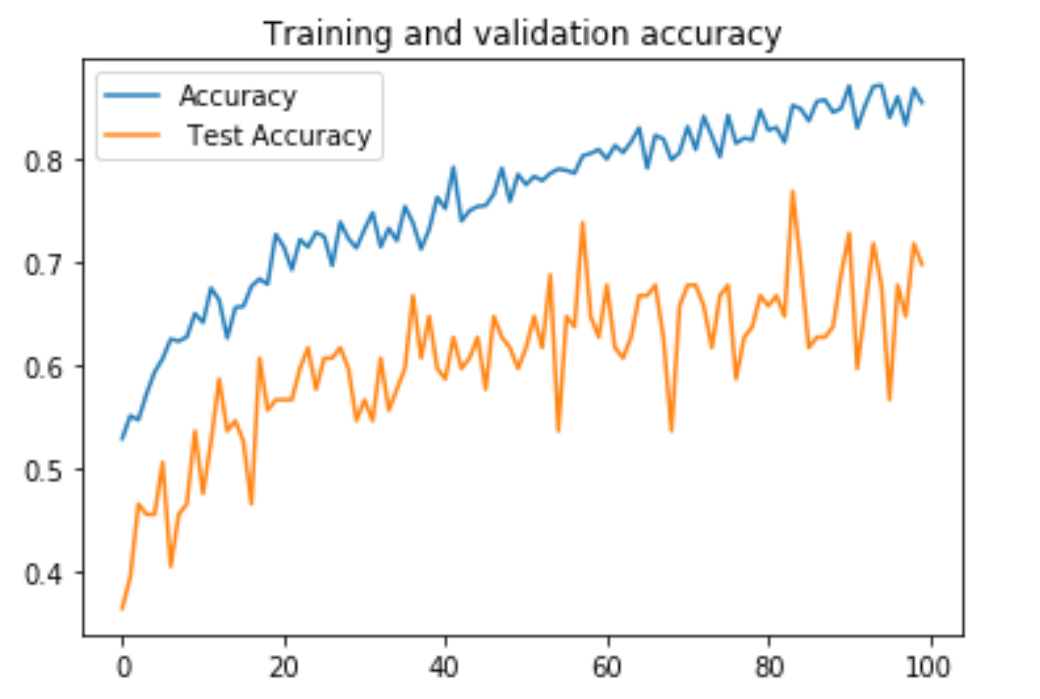
Overfitting and Underfitting



Model Description

```
Model: "sequential"
_________________________________________________________________
Layer (type)                 Output Shape              Param #
=================================================================
conv2d (Conv2D)              (None, 238, 238, 16)      448
_________________________________________________________________
max_pooling2d (MaxPooling2D) (None, 119, 119, 16)      0
_________________________________________________________________
conv2d_1 (Conv2D)            (None, 117, 117, 32)      4640
_________________________________________________________________
max_pooling2d_1 (MaxPooling2 (None, 58, 58, 32)        0
_________________________________________________________________
conv2d_2 (Conv2D)            (None, 56, 56, 64)        18496
_________________________________________________________________
max_pooling2d_2 (MaxPooling2 (None, 28, 28, 64)        0
_________________________________________________________________
conv2d_3 (Conv2D)            (None, 26, 26, 128)       73856
_________________________________________________________________
max_pooling2d_3 (MaxPooling2 (None, 13, 13, 128)       0
_________________________________________________________________
flatten (Flatten)            (None, 21632)             0
_________________________________________________________________
dense (Dense)                (None, 512)               11076096
_________________________________________________________________
dropout (Dropout)            (None, 512)               0
_________________________________________________________________
dense_1 (Dense)              (None, 1)                 513
=================================================================
Total params: 11,174,049
Trainable params: 11,174,049
```

Performance Curves



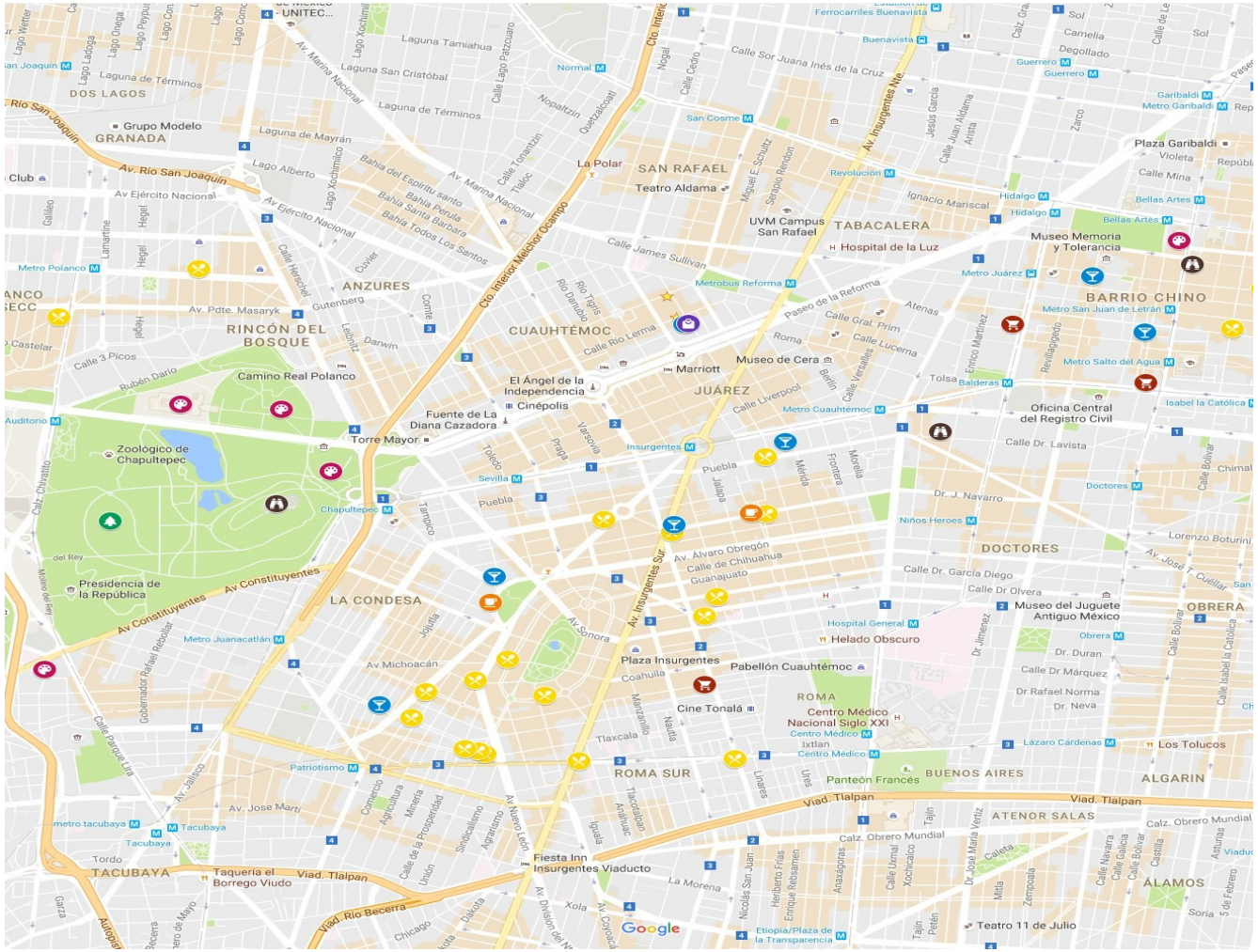
Let’s talk about Android

Only A Little

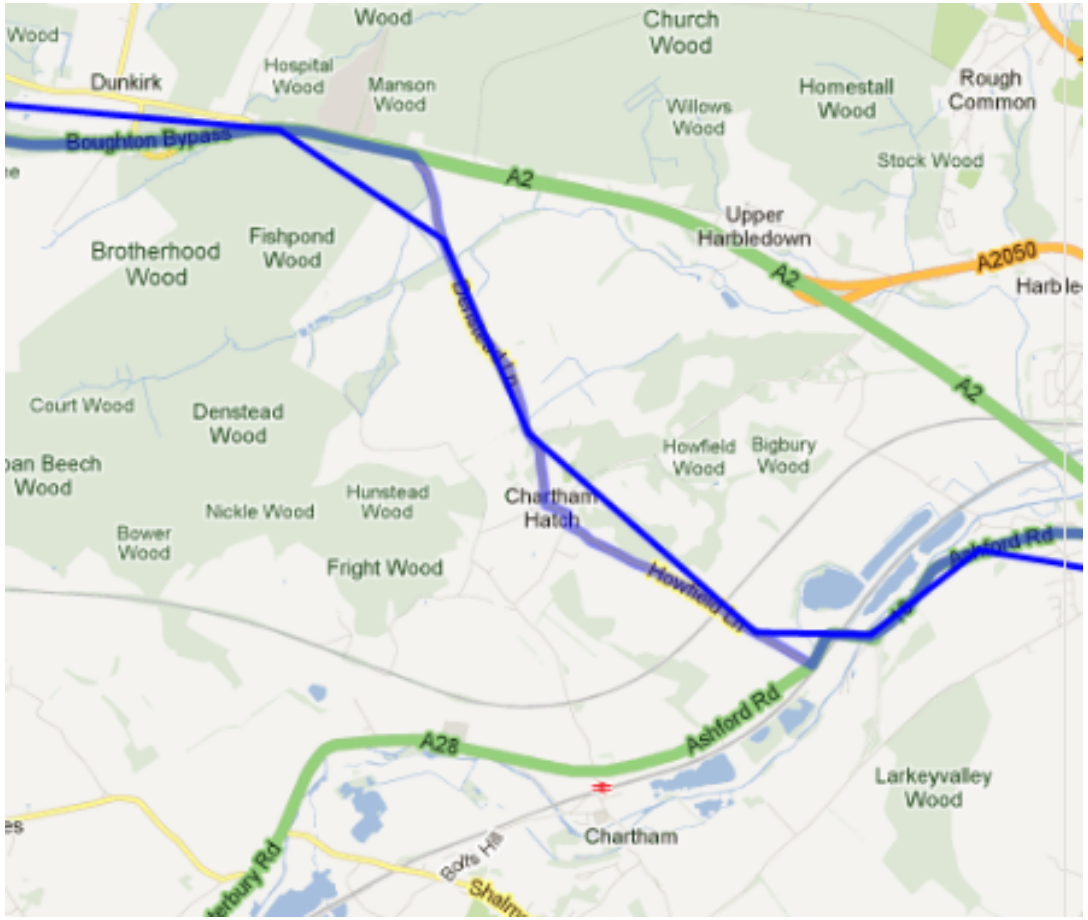
- Google Map API
- Polyline

Google Map API

Google Maps


Av. Río San Joaquín
Av Ejército Nacional
Av. Marina Nacional
Laguna de Términos
Laguna Tamiahua
Laguna San Cristóbal
Laguna de Mayrán
Lago Alberto
Lago Xochimilco
Bahía del Espíritu santo
Bahía Perula
Bahía Santa Bárbara
Bahía Todos Los Santos
Cto. Interior Mexicano Ocampo
Av. Insurgentes Sur
Av. Insurgentes Mte.
Calle James Sullivan
Calle Río Lerma
Paseo de la Reforma
Calle Gral. Prim
Calle Lucerna
Calle Liverpool
Calle Berlín
Calle Versalles
Calle Roma
Calle Sor Juana Inés de la Cruz
Calle Pedro
Calle Tonantzin
Calle Tlaloc
Calle Lago Patzcuaro
Calle Lago Xochimilco
Calle Lago Ontario
Calle Lago Ladoga
Calle Lago Onega
Calle Lago Peipus
Calle Lago Como
Calle Lago Constanza
Calle Lago Wetter
Calle Lago Comic
Calle Lago Chalco
Calle Lago Texcoco
Calle Lago Zirahuen
Calle Lago Pát

Polyline


Wood
Church Wood
Dunkirk
Hospital Wood
Manson Wood
Willows Wood
Homestall Wood
Rough Common
Boughton Bypass
A2
Stock Wood
Upper Harbledown
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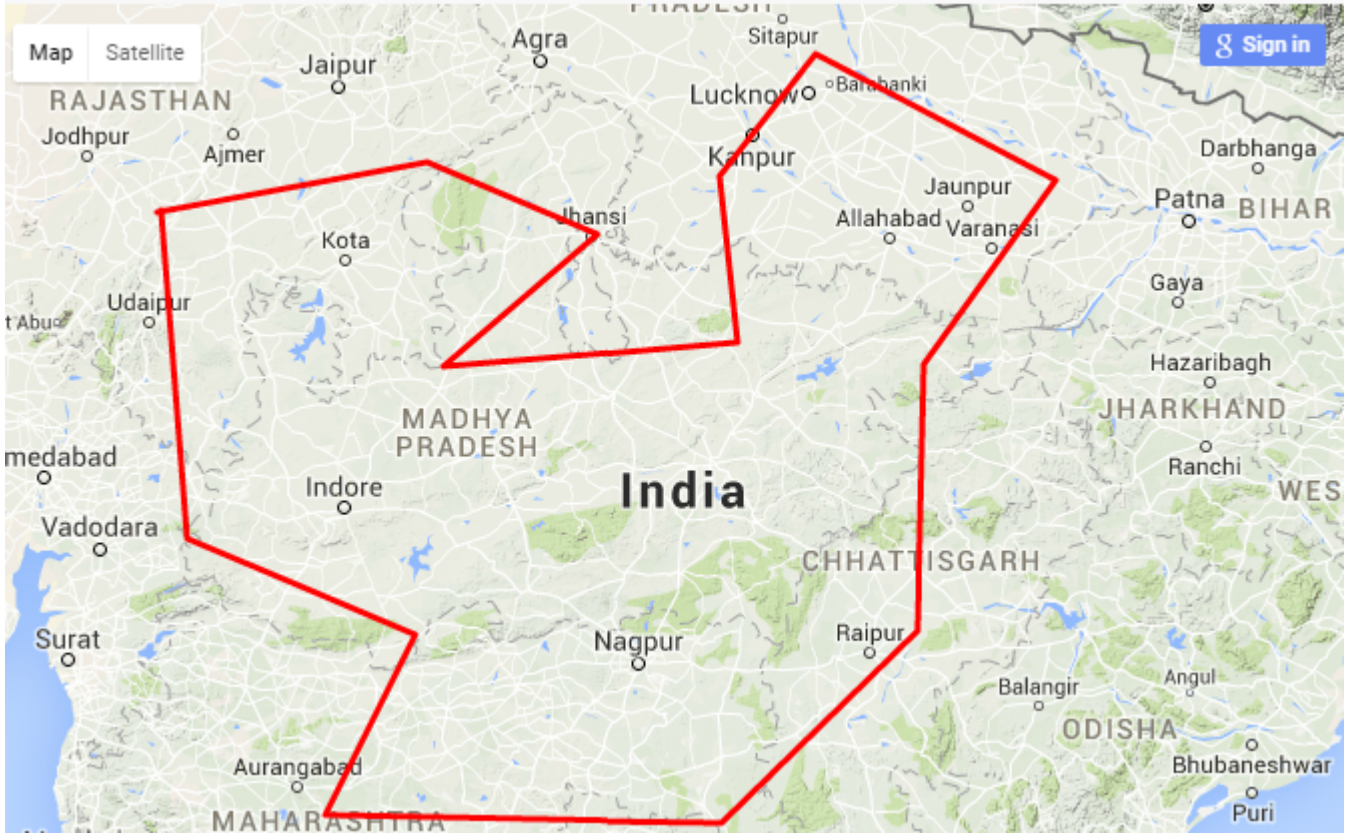
Brotherhood Wood
Fishpond Wood
Court Wood
Denstead Wood
Howfield Wood
Bigbury Wood
Nickle Wood
Hunstead Wood
Chartham Hatch
Bower Wood
Fright Wood
Howfield Link
Ashford Rd
A28
Larkeyvalley Wood
Chartham
Govts Hill

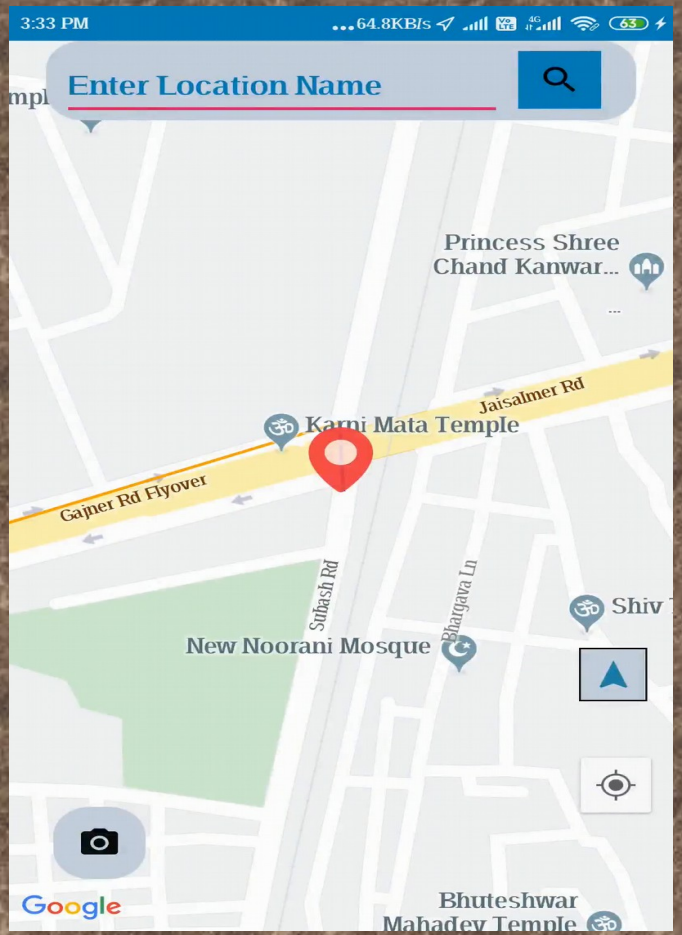

Map
Satellite
Sign in
Agra
Sitapur
Jaipur
RAJASTHAN
Lucknow
Barabanki
Jodhpur
Ajmer
Kanpur
Darbhanga
Jaunpur
Patna
BIHAR
Jhansi
Allahabad
Varanasi
Kota
Udaipur
Gaya
Hazaribagh
MADHYA PRADESH
JHARKHAND
India
Indore
Ranchi
Vadodara
CHHATTISGARH
Surat
Nagpur
Raipur
Balangir
Angul
ODISHA
Aurangabad
Bhubaneshwar
MAHARASHTRA
Puri

Implementation

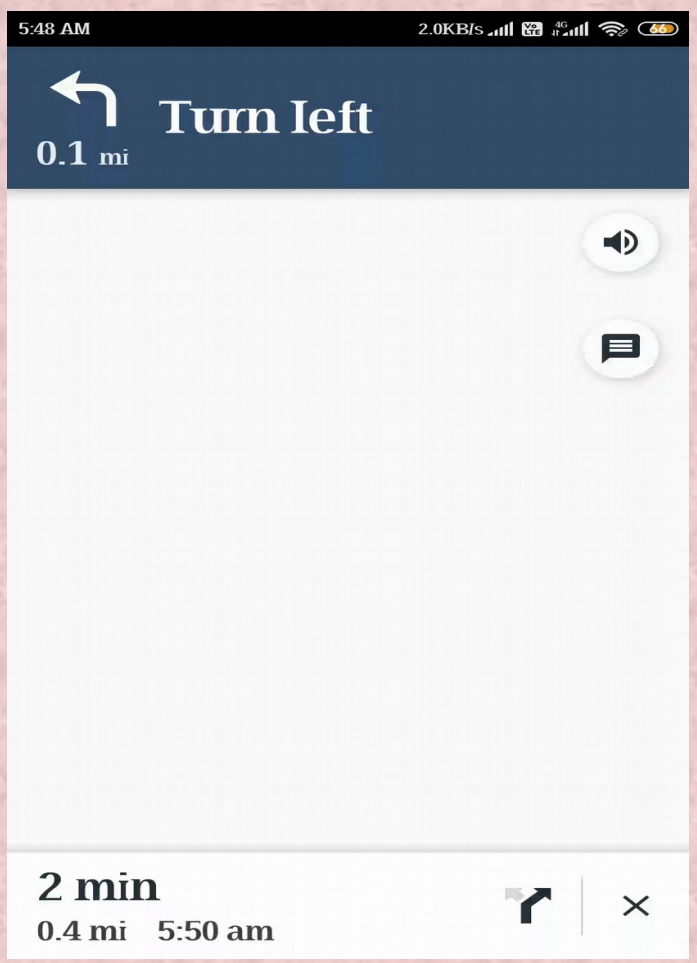
- Detection
- GPS(Global Positioning System)
- Array List
- Polyline
- Color coding

App’s icon

Demo Video of the App



Demo Video Of Navigation



Any Questions

thank you!

petbackgrounds.org