# Deeplearning

# Azure

Face detection, emotion, verify …

<https://azure.microsoft.com/en-in/services/cognitive-services/face/>

# Dlib installaiton

## whl

* python -m pip install <https://files.pythonhosted.org/packages/0e/ce/f8a3cff33ac03a8219768f0694c5d703c8e037e6aba2e865f9bae22ed63c/dlib-19.8.1-cp36-cp36m-win_amd64.whl#sha256=794994fa2c54e7776659fddb148363a5556468a6d5d46be8dad311722d54bfcf>

## using anaconda working

> conda update -n base -c defaults conda

> conda install -c conda-forge dlib

# Convolution Filter

import cv2

import numpy as np

import matplotlib.pyplot as plt

%matplotlib inline

def crop\_center(img,cropx,cropy):

y,x = img.shape

startx = x//2-(cropx//2)

starty = y//2-(cropy//2)

return img[starty:starty+cropy,startx:startx+cropx]

def convolution(image, kernel):

Im, In = image.shape

Km, Kn = kernal.shape

output = np.zeros\_like(image)

for y in range(In - Kn + 1):

for x in range(Im - Km + 1):

output[y,x] = (kernel\*image[y:y+Km, x:x+Kn]).sum()

return output

# Read image

img = cv2.imread("image.jpg", 0)

img = crop\_center(img, 160, 160)

plt.imshow(img)

# Read kernal

kernel = np.array([[1, 0, -1],

[0, 0, 0],

[-1, 0, 1]])

# Add padding to img

padd\_img = np.pad(img, ((1,1),(1,1)), 'constant')

# Apply convolution

kernel = np.array([[-1,-1,-1],[-1,8,-1],[-1,-1,-1]])

edge\_kernel = np.array([[-1,-1,-1],[-1,8,-1],[-1,-1,-1]])

blur\_kernel = np.array([[1,1,1],[1,1,1],[1,1,1]])/9.0;

output = convolution(padd\_img,blur\_kernel)

plt.imshow(output)

plt.show()

# CNN only using Numpy

<https://www.kdnuggets.com/2018/04/building-convolutional-neural-network-numpy-scratch.html>

1. Reading the input image.
2. Preparing filters.
3. Conv layer: Convolving each filter with the input image.
4. ReLU layer: Applying ReLU activation function on the feature maps (output of conv layer).
5. Max Pooling layer: Applying the pooling operation on the output of ReLU layer.
6. Stacking conv, ReLU, and max pooling layers.
7. Reading input image

import skimage.data

# Reading the image

img = skimage.data.chelsea()

# Converting the image into gray.

img = skimage.color.rgb2gray(img)

1. Preparing filters

The following code prepares the filters bank for the first conv layer (l1 for short):

The values of the kernel filters are learned automatically by the neural network through the training process, and the filters kernels which results in the features that are most efficient for the particular classification or the detection are automatically learned.

l1\_filter = numpy.zeros((2,3,3)) # (2=num\_filters, 3=num\_rows\_filter, 3=num\_columns\_filter)

# If the image is RGB with 3 channels, the filter size must be (2, 3, 3=depth).

The size of the filters bank is specified by the above zero array but not the actual values of the filters. It is possible to override such values as follows to detect vertical and horizontal edges.

l1\_filter[0, :, :] = numpy.array([[[-1, 0, 1],

[-1, 0, 1],

[-1, 0, 1]]])

l1\_filter[1, :, :] = numpy.array([[[1, 1, 1],

[0, 0, 0],

[-1, -1, -1]]])

3. Conv Layer

def conv(img, conv\_filter):

if len(img.shape) > 2 or len(conv\_filter.shape) > 3: # Check if number of image channels matches the filter depth.

if img.shape[-1] != conv\_filter.shape[-1]:

print("Error: Number of channels in both image and filter must match.")

sys.exit()

if conv\_filter.shape[1] != conv\_filter.shape[2]: # Check if filter dimensions are equal.

print('Error: Filter must be a square matrix. I.e. number of rows and columns must match.')

sys.exit()

if conv\_filter.shape[1]%2==0: # Check if filter diemnsions are odd.

print('Error: Filter must have an odd size. I.e. number of rows and columns must be odd.')

sys.exit()

# An empty feature map to hold the output of convolving the filter(s) with the image.

feature\_maps = np.zeros((img.shape[0]-conv\_filter.shape[1]+1,

img.shape[1]-conv\_filter.shape[1]+1,

conv\_filter.shape[0]))

# Convolving the image by the filter(s).

for filter\_num in range(conv\_filter.shape[0]):

print("Filter ", filter\_num + 1)

curr\_filter = conv\_filter[filter\_num, :] # getting a filter from the bank.

"""

Checking if there are mutliple channels for the single filter.

If so, then each channel will convolve the image.

The result of all convolutions are summed to return a single feature map.

"""

if len(curr\_filter.shape) > 2:

conv\_map = conv\_(img[:, :, 0], curr\_filter[:, :, 0]) # Array holding the sum of all feature maps.

for ch\_num in range(1, curr\_filter.shape[-1]): # Convolving each channel with the image and summing the results.

conv\_map = conv\_map + conv\_(img[:, :, ch\_num],

curr\_filter[:, :, ch\_num])

else: # There is just a single channel in the filter.

conv\_map = conv\_(img, curr\_filter)

feature\_maps[:, :, filter\_num] = conv\_map # Holding feature map with the current filter.

return feature\_maps # Returning all feature maps.

def conv\_(img, conv\_filter):

filter\_size = conv\_filter.shape[0]

result = np.zeros((img.shape))

#Looping through the image to apply the convolution operation.

for r in np.uint16(np.arange(filter\_size/2,

img.shape[0]-filter\_size/2-2)):

for c in np.uint16(np.arange(filter\_size/2, img.shape[1]-filter\_size/2-2)):

#Getting the current region to get multiplied with the filter.

curr\_region = img[r:r+filter\_size, c:c+filter\_size]

#Element-wise multipliplication between the current region and the filter.

curr\_result = curr\_region \* conv\_filter

conv\_sum = np.sum(curr\_result) #Summing the result of multiplication.

result[r, c] = conv\_sum #Saving the summation in the convolution layer feature map.

#Clipping the outliers of the result matrix.

final\_result = result[np.uint16(filter\_size/2):result.shape[0]-np.uint16(filter\_size/2),

np.uint16(filter\_size/2):result.shape[1]-np.uint16(filter\_size/2)]

return final\_result

l1\_feature\_map = conv(img, l1\_filter)

4. ReLU Layer

def relu(feature\_map):

#Preparing the output of the ReLU activation function.

relu\_out = np.zeros(feature\_map.shape)

for map\_num in range(feature\_map.shape[-1]):

for r in np.arange(0,feature\_map.shape[0]):

for c in np.arange(0, feature\_map.shape[1]):

relu\_out[r, c, map\_num] = np.max(feature\_map[r, c, map\_num], 0)

return relu\_out

l1\_feature\_map\_relu = relu(l1\_feature\_map)

5. Max Pooling Layer

def pooling(feature\_map, size=2, stride=2):

#Preparing the output of the pooling operation.

pool\_out = np.zeros((np.uint16((feature\_map.shape[0]-size+1)/stride),

np.uint16((feature\_map.shape[1]-size+1)/stride),

feature\_map.shape[-1]))

for map\_num in range(feature\_map.shape[-1]):

r2 = 0

for r in np.arange(0,feature\_map.shape[0]-size-1, stride):

c2 = 0

for c in np.arange(0, feature\_map.shape[1]-size-1, stride):

pool\_out[r2, c2, map\_num] = np.max(feature\_map[r:r+size, c:c+size])

c2 = c2 + 1

r2 = r2 +1

return pool\_out

l1\_feature\_map\_relu\_pool = pooling(l1\_feature\_map\_relu, 2, 2)

6. Stacking Layers

Up to this point, the CNN architecture with conv, ReLU, and max pooling layers is complete. There might be some other layers to be stacked in addition to the previous ones as below.

# Second conv layer

l2\_filter = np.random.rand(3, 5, 5, l1\_feature\_map\_relu\_pool.shape[-1])

print("\n\*\*Working with conv layer 2\*\*")

l2\_feature\_map = conv(l1\_feature\_map\_relu\_pool, l2\_filter)

print("\n\*\*ReLU\*\*")

l2\_feature\_map\_relu = relu(l2\_feature\_map)

print("\n\*\*Pooling\*\*")

l2\_feature\_map\_relu\_pool = pooling(l2\_feature\_map\_relu, 2, 2)

print("\*\*End of conv layer 2\*\*\n")

# Keras

## Artificial neural network

import keras

from keras import backend as K

from keras.models import Sequential

from keras.layers import Activation

from keras.layers.core import Dense

from keras.optimizers import Adam

from keras.metrics import categorical\_crossentropy

Defining model

# model = Sequential([l1,l2,l3])

# model.add(l4)

# model.app(l5)

model = Sequential([

Dense(16, input\_shape=(1,), activation='relu'),

Dense(32, activation='relu'),

Dense(2,activation='softmax')

])

model.summary()

Compilling model

model.compile(Adam(lr=.0001),

loss='sparse\_categorical\_crossentropy',

metrics=['accuracy'])

Training model

model.fit(training\_samples, training\_labels,

batch\_size=10,

epochs=20,

shuffle=True,

verbose=2)

# verbose - printing output

# Word2vec tensorflow

Video: <https://www.youtube.com/watch?v=-3XedqEZpR4>

Code: <https://github.com/nikhilroxtomar/Word2vec>

import numpy as np

import tensorflow as tf

import string

import nltk

import pandas as pd

from sklearn.manifold import TSNE

import matplotlib.pyplot as plt

#\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

data\_file = "avengers\_2012.txt"

f = open(data\_file, "r")

raw\_data = f.read()

raw\_data = raw\_data[:50000]

#\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

def clean\_text(text):

text = text.lower()

text = text.replace("\n", "")

text = text.replace("\xad", "")

text = text.replace("'ve", " have")

text = text.replace("'t", " not")

text = text.replace("'s", " is")

text = text.replace("'m", " am")

## Specific Words

text = text.replace("p.e.g.a.s.u.s", "pegasus")

text = text.replace("s.h.i.e.l.d.", "shield")

text = text.replace("s.h.i.e.l.d", "shield")

text = text.replace("(v.o.)", "(vo)")

text = text.replace("dr.", "dr")

text = text.replace("...", "")

text = text.replace("'", "")

text = text.replace('"', "")

## Numbers with Word

text = text.replace("0", " zero ")

text = text.replace("1", " one ")

text = text.replace("2", " two ")

text = text.replace("3", " three ")

text = text.replace("4", " four ")

text = text.replace("5", " five ")

text = text.replace("6", " six ")

text = text.replace("7", " seven ")

text = text.replace("8", " eight ")

text = text.replace("9", " nine ")

punc = set(string.punctuation)

for p in punc:

if p != ".":

#text = text.replace(p, " " + p + " ")

text = text.replace(p, " ")

text = " ".join(text.split())

return text

#\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

data = clean\_text(raw\_data)

#\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

split\_data = []

stopwords = nltk.corpus.stopwords.words("english")

for lines in data.split("."):

tmp\_line = []

for word in lines.strip().split(" "):

if word not in stopwords:

if len(word) > 0:

tmp\_line.append(word)

if len(tmp\_line) > 0:

split\_data.append(tmp\_line)

#\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

def prepare\_dictionary(data):

idx = 0

word2idx = {}

idx2word = {}

for line in data:

for word in line:

if word not in word2idx.keys():

word2idx[word] = idx

idx2word[idx] = word

idx += 1

vocab\_size = len(word2idx.keys())

return vocab\_size, word2idx, idx2word

vocab\_size, word2idx, idx2word = prepare\_dictionary(split\_data)

print("Vocab Size: ", vocab\_size)

#\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

def prepare\_dataset(data, word2idx, vocab\_size, window=5):

X = []

Y = []

for line in data:

fn = window//2

line\_len = len(line)

if line\_len > window:

for i in range(line\_len):

a = line[i]

b = []

for j in range(window):

idx = i+j-fn

if (idx != i) and (idx >= 0 and idx < line\_len):

x = word2idx[line[i]]

y = word2idx[line[idx]]

X.append(x)

Y.append(y)

X = np.array(X)

Y = np.array(Y)

return X, Y

#\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

X, Y = prepare\_dataset(split\_data, word2idx, vocab\_size)

print(split\_data[0])

for i in range(10):

print("{:10s} - {:10s}".format(idx2word[X[i]], idx2word[Y[i]]))

#\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

def onehot\_encoding(x, y):

X = tf.one\_hot(x, vocab\_size)

Y = tf.one\_hot(y, vocab\_size)

return X, Y

#\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

def batch\_dataset(x, y, batch\_size=1024, prefetch=2):

dataset = tf.data.Dataset.from\_tensor\_slices((x, y))

dataset = dataset.map(onehot\_encoding)

dataset = dataset.batch(batch\_size)

dataset = dataset.prefetch(prefetch)

itr = dataset.make\_initializable\_iterator()

return itr.initializer, itr.get\_next()

#\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

x\_inputs = tf.placeholder(tf.float32, shape=[None, vocab\_size])

y\_labels = tf.placeholder(tf.float32, shape=[None, vocab\_size])

global\_step = tf.train.create\_global\_step()

embed\_dim = 32

# hidden layer: which represents word vector eventually

W1 = tf.Variable(tf.random\_uniform([vocab\_size, embed\_dim]))

b1 = tf.Variable(tf.random\_uniform([1]))

hidden\_layer = tf.add(tf.matmul(x\_inputs, W1), b1)

# output layer

W2 = tf.Variable(tf.random\_uniform([embed\_dim, vocab\_size]))

b2 = tf.Variable(tf.random\_uniform([1]))

prediction = tf.nn.softmax(tf.add( tf.matmul(hidden\_layer, W2), b2))

# loss function: cross entropy

loss = tf.reduce\_mean(-tf.reduce\_sum(y\_labels \* tf.log(prediction), axis=[1]))

# training operation

train\_op = tf.train.AdamOptimizer().minimize(loss)

#\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

sess = tf.Session()

init = tf.global\_variables\_initializer()

sess.run(init)

saver = tf.train.Saver()

#\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

saver.restore(sess, save\_path="weights/word2vec-0")

#\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

for i in range(100):

itr, data = batch\_dataset(X, Y)

sess.run(itr)

loss\_val = []

while True:

try:

bx, by = sess.run(data)

\_, l = sess.run([train\_op, loss], feed\_dict={x\_inputs: bx, y\_labels: by})

loss\_val.append(l)

except tf.errors.OutOfRangeError as e:

break

if (i+1) % 10 == 0:

loss\_mean\_val = np.mean(loss\_val)

print("Epoch: {0} - Loss: {1}".format(i+1, loss\_mean\_val))

saver.save(sess, save\_path="weights/word2vec", global\_step=global\_step)

#\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# Now the hidden layer (W1 + b1) is actually the word look up table

vectors = sess.run(W1 + b1)

words = list(word2idx.keys())

print(words[0], vectors[0])

#\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

tsne = TSNE(n\_components=2, random\_state=0)

X\_embed = tsne.fit\_transform(vectors)

points = pd.DataFrame(X\_embed, columns = ['x', 'y'], dtype="float64")

points["word"] = words

points

#\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

plt.figure(figsize=(50, 50))

for i in range(len(words)):

word = words[i]

x = points.x[i]

y = points.y[i]

plt.scatter(x, y)

plt.annotate(word, xy=(x, y), xytext=(5, 5), textcoords='offset points', ha='right', va='bottom')

plt.savefig("word2vec.png")

plt.show()

#\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

word2vec\_dict = {words[i]: vectors[i] for i in range(len(words))}

#\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

def cosine\_sim(a, b):

return np.dot(a, b)/(np.linalg.norm(a)\*np.linalg.norm(b))

#\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

print(cosine\_sim(word2vec\_dict["coulson"], word2vec\_dict["phil"]))

print(cosine\_sim(word2vec\_dict["iron"], word2vec\_dict["man"]))

print(cosine\_sim(word2vec\_dict["shield"], word2vec\_dict["avengers"]))

#\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

def similarity(a, k=20):

a\_vec = word2vec\_dict[a]

word\_sim = {}

for key in word2vec\_dict:

sim = cosine\_sim(a\_vec, word2vec\_dict[key])

word\_sim[key] = sim

sim = sorted(word\_sim.items(), key=lambda kv: kv[1])

sim.reverse()

sim = sim[1:k+1]

return sim

similarity("king")

#\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# Reference

<https://deeplizard.com/learn/playlist/PLZbbT5o_s2xrfNyHZsM6ufI0iZENK9xgG>

# Keras Errors

## Tensor Tensor("activation\_2/Softmax:0", shape=(?, 22), dtype=float32) is not an element of this graph.

import tensorflow as tf

graph = tf.get\_default\_graph()

def test():

with graph.as\_default():

current\_prediction = model.predict([current\_story, current\_query])

## SVC' object has no attribute '\_impl

Use the same version of “scikit-learn” as we train the model

# Image to Json

## pytessract

### error

#### TesseractNotFoundError: <full\_path\_to\_your\_tesseract\_executable> is not installed or it's not in your path

> <https://pypi.org/project/pytesseract/>

> <https://github.com/tesseract-ocr/tesseract>

> <https://github.com/tesseract-ocr/tesseract/wiki>

> <https://github.com/UB-Mannheim/tesseract/wiki>

> <https://digi.bib.uni-mannheim.de/tesseract/tesseract-ocr-w64-setup-v5.0.0-alpha.20191030.exe>

> install exc

In code

import pytesseract

pytesseract.pytesseract.tesseract\_cmd = r'C:\Users\abhijith.m\AppData\Local\Tesseract-OCR\tesseract.exe'

# Face Recognition

## Github

<https://github.com/krasserm/face-recognition>

## Deepface

[Video](https://www.youtube.com/@sefiks)

* Vgg [model](https://www.kaggle.com/datasets/acharyarupak391/vggfaceweights?resource=download)
* Create “database” folder and put all employee images
* Realtime\_face\_rec\_vgg.py

#author Sefik Ilkin Serengil  
#you can find the documentation of this code from the following link: https://sefiks.com/2018/08/06/deep-face-recognition-with-keras/  
  
import numpy as np  
import cv2  
  
from keras.models import Model, Sequential  
from keras.layers import Input, Convolution2D, ZeroPadding2D, MaxPooling2D, Flatten, Dense, Dropout, Activation  
from PIL import Image  
from keras.preprocessing.image import load\_img, save\_img, img\_to\_array  
from keras.applications.imagenet\_utils import preprocess\_input  
from keras.preprocessing import image  
import matplotlib.pyplot as plt  
  
from os import listdir  
import os  
#-----------------------  
  
color = (67, 67, 67)  
  
opencv\_home = cv2.\_\_file\_\_  
folders = opencv\_home.split(os.path.sep)[0:-1]  
path = folders[0]  
for folder in folders[1:]:  
 path = path + "/" + folder  
detector\_path = path+"/data/haarcascade\_frontalface\_default.xml"  
print(detector\_path)  
  
if os.path.isfile(detector\_path) != True:  
 raise ValueError("Confirm that opencv is installed on your environment! Expected path ",detector\_path," violated.")  
else:  
 face\_cascade = cv2.CascadeClassifier(detector\_path)  
  
def preprocess\_image(image\_path):  
 img = load\_img(image\_path, target\_size=(224, 224))  
 img = img\_to\_array(img)  
 img = np.expand\_dims(img, axis=0)  
   
 # preprocess\_input normalizes input in scale of [-1, +1]. You must apply same normalization in prediction.  
 # Ref: https://github.com/keras-team/keras-applications/blob/master/keras\_applications/imagenet\_utils.py (Line 45)  
 img = preprocess\_input(img)  
 return img  
  
def loadVggFaceModel():  
 model = Sequential()  
 model.add(ZeroPadding2D((1,1),input\_shape=(224,224, 3)))  
 model.add(Convolution2D(64, (3, 3), activation='relu'))  
 model.add(ZeroPadding2D((1,1)))  
 model.add(Convolution2D(64, (3, 3), activation='relu'))  
 model.add(MaxPooling2D((2,2), strides=(2,2)))  
  
 model.add(ZeroPadding2D((1,1)))  
 model.add(Convolution2D(128, (3, 3), activation='relu'))  
 model.add(ZeroPadding2D((1,1)))  
 model.add(Convolution2D(128, (3, 3), activation='relu'))  
 model.add(MaxPooling2D((2,2), strides=(2,2)))  
  
 model.add(ZeroPadding2D((1,1)))  
 model.add(Convolution2D(256, (3, 3), activation='relu'))  
 model.add(ZeroPadding2D((1,1)))  
 model.add(Convolution2D(256, (3, 3), activation='relu'))  
 model.add(ZeroPadding2D((1,1)))  
 model.add(Convolution2D(256, (3, 3), activation='relu'))  
 model.add(MaxPooling2D((2,2), strides=(2,2)))  
  
 model.add(ZeroPadding2D((1,1)))  
 model.add(Convolution2D(512, (3, 3), activation='relu'))  
 model.add(ZeroPadding2D((1,1)))  
 model.add(Convolution2D(512, (3, 3), activation='relu'))  
 model.add(ZeroPadding2D((1,1)))  
 model.add(Convolution2D(512, (3, 3), activation='relu'))  
 model.add(MaxPooling2D((2,2), strides=(2,2)))  
  
 model.add(ZeroPadding2D((1,1)))  
 model.add(Convolution2D(512, (3, 3), activation='relu'))  
 model.add(ZeroPadding2D((1,1)))  
 model.add(Convolution2D(512, (3, 3), activation='relu'))  
 model.add(ZeroPadding2D((1,1)))  
 model.add(Convolution2D(512, (3, 3), activation='relu'))  
 model.add(MaxPooling2D((2,2), strides=(2,2)))  
  
 model.add(Convolution2D(4096, (7, 7), activation='relu'))  
 model.add(Dropout(0.5))  
 model.add(Convolution2D(4096, (1, 1), activation='relu'))  
 model.add(Dropout(0.5))  
 model.add(Convolution2D(2622, (1, 1)))  
 model.add(Flatten())  
 model.add(Activation('softmax'))  
   
 # you can download pretrained weights from https://drive.google.com/file/d/1CPSeum3HpopfomUEK1gybeuIVoeJT\_Eo/view?usp=sharing  
 from keras.models import model\_from\_json  
 model.load\_weights('weights/vgg\_face\_weights.h5')  
   
 vgg\_face\_descriptor = Model(inputs=model.layers[0].input, outputs=model.layers[-2].output)  
   
 return vgg\_face\_descriptor  
  
model = loadVggFaceModel()  
  
#------------------------  
  
#put your employee pictures in this path as name\_of\_employee.jpg  
employee\_pictures = "database/"  
  
employees = dict()  
  
for file in listdir(employee\_pictures):  
 employee, extension = file.split(".")  
 employees[employee] = model.predict(preprocess\_image('database/%s.jpg' % (employee)))[0,:]  
   
print("employee representations retrieved successfully")  
  
def findCosineSimilarity(source\_representation, test\_representation):  
 a = np.matmul(np.transpose(source\_representation), test\_representation)  
 b = np.sum(np.multiply(source\_representation, source\_representation))  
 c = np.sum(np.multiply(test\_representation, test\_representation))  
 return 1 - (a / (np.sqrt(b) \* np.sqrt(c)))  
  
#------------------------  
  
cap = cv2.VideoCapture("abhi\_raghesh.mp4") #webcam  
#cap = cv2.VideoCapture('C:/Users/IS96273/Desktop/zuckerberg.mp4') #video  
  
while(True):  
 ret, img = cap.read()  
 if not ret:  
 break  
 # img = cv2.resize(img, (640, 360))  
 faces = face\_cascade.detectMultiScale(img, 1.3, 5)  
   
 for (x,y,w,h) in faces:  
 if w > 130:   
 # cv2.rectangle(img,(x,y),(x+w,y+h),(255,0,0),2) #draw rectangle to main image  
   
 detected\_face = img[int(y):int(y+h), int(x):int(x+w)] # crop detected face  
 try:  
 sm = cv2.Laplacian(detected\_face, cv2.CV\_64F).var()  
 if sm < 50:  
 continue  
 except:  
 pass  
 detected\_face = cv2.resize(detected\_face, (224, 224)) # resize to 224x224  
 img\_pixels = image.img\_to\_array(detected\_face)  
 img\_pixels = np.expand\_dims(img\_pixels, axis = 0)  
 # img\_pixels /= 255  
 # employee dictionary is using preprocess\_image and it normalizes in scale of [-1, +1]  
 img\_pixels /= 127.5  
 img\_pixels -= 1  
   
 captured\_representation = model.predict(img\_pixels)[0,:]  
   
 found = 0  
 for i in employees:  
 employee\_name = i  
 representation = employees[i]  
   
 similarity = findCosineSimilarity(representation, captured\_representation)  
 if(similarity < 0.25):  
 cv2.putText(img, employee\_name, (int(x+w+15), int(y-12)), cv2.FONT\_HERSHEY\_SIMPLEX, 1, color, 2)  
 print(employee\_name, similarity)  
 found = 1  
 break  
   
 # connect face and text  
 cv2.line(img,(int((x+x+w)/2),y+15),(x+w,y-20),color,1)  
 cv2.line(img,(x+w,y-20),(x+w+10,y-20),color,1)  
   
 if(found == 0): # if found image is not in employee database  
 cv2.putText(img, 'unknown', (int(x+w+15), int(y-12)), cv2.FONT\_HERSHEY\_SIMPLEX, 1, color, 2)  
  
 cv2.imshow('img',img)  
   
 if cv2.waitKey(1) & 0xFF == ord('q'): # press q to quit  
 break  
   
#kill open cv things   
cap.release()  
cv2.destroyAllWindows()

# Person detection

## YOLO

<https://github.com/ndaidong/yolo-person-detect>

# Age gender classification

## Inception

<https://github.com/OValery16/gender-age-classification>

# KNN training with probability

knn = KNeighborsClassifier(n\_neighbors=2, metric='euclidean', weights='distance')

# Reference

## Face Detection

### MTCNN

<https://github.com/ipazc/mtcnn>

# Custom Object Detection

Tutorial: <https://www.youtube.com/watch?v=wdufj-pjE5c&list=PLoY9f-5DCBlkvkvDjwa5Dn4WXjhTA5K7v>

Installation: <https://gilberttanner.com/blog/installing-the-tensorflow-object-detection-api>

Tensorflow Model :- <https://github.com/tensorflow/models>

tensorflow==1.14

Pillow==6.1.0

contextlib2==0.5.5

Cython==0.29.14

lxml==4.4.0

matplotlib==3.1.1

Installation:- <https://github.com/tensorflow/models/blob/master/research/object_detection/g3doc/installation.md>

Protocolbuff:- <https://github.com/protocolbuffers/protobuf/releases>

Download protobuff windows:- <https://github.com/protocolbuffers/protobuf/releases/download/v3.11.4/protoc-3.11.4-win64.zip>

Run this in cmd:-

(ai) C:\Users\MY\0\_my\_project\Zerone\invoice\_rec\models\research>python use\_protobuf.py object\_detection/protos C:/Users/MY/0\_my\_project/Zerone/invoice\_rec/bin/protoc

* Now you can check the python file is created in the directory

C:\Users\MY\0\_my\_project\Zerone\invoice\_rec\models\research\object\_detection\protos

Install make.exc:- <http://gnuwin32.sourceforge.net/packages/make.htm>

Install pycocoapi:- <https://www.youtube.com/watch?v=2TikTv6PWDw>

# To install and compile to your anaconda/python site-packages, simply run:

# $ pip install git+https://github.com/philferriere/cocoapi.git#subdirectory=PythonAPI

# Note that the original compile flags below are GCC flags unsupported by the Visual C++ 2015 build tools.

# They can safely be removed.

Visual studio build tools:- <https://visualstudio.microsoft.com/visual-cpp-build-tools/>

Visual studio 2015: - <https://devblogs.microsoft.com/python/unable-to-find-vcvarsall-bat/>

Protobuff: <https://github.com/protocolbuffers/protobuf/releases/download/v3.12.3/protoc-3.12.3-win64.zip>

Errors

contrib module is no longer available in TensorFlow 2.0, but you can use with this;  
import tensorflow.compat.v1 as tf  
tf.disable\_v2\_behavior()

or uninstall TensorFlow and install oldest version with this;  
pip install tensorflow==1.14

Add this line in model\_main.py file

import sys

# print("in frcnn",sys.path)

sys.path.append("C:/Users/MY/0\_my\_project/Zerone/invoice\_rec/models/research/slim")

# print(sys.path)

Object detection tensorflow api: [file:///C:/Users/MY/0\_my\_project/Zerone/invoice\_rec/models/research/object\_detection/object\_detection\_tutorial.ipynb](file:///C:\Users\MY\0_my_project\Zerone\invoice_rec\models\research\object_detection\object_detection_tutorial.ipynb)

## Train custom model

<https://gilberttanner.com/blog/creating-your-own-objectdetector>

Error: tensorflow.python.framework.errors\_impl.NotFoundError: C:\Users\MY\AppData\Local\conda\conda\envs\ai\lib\site-packages\tensorflow\contrib\rnn\python\ops\\_gru\_ops.so not found

* Conda install tensorflow==1.14

# Realtime Multi-Person Pose Estimation

This is a keras version of [Realtime Multi-Person Pose Estimation](<https://github.com/ZheC/Realtime_Multi-Person_Pose_Estimation>) project

**## Introduction**

Code repo for reproducing [2017 CVPR](<https://arxiv.org/abs/1611.08050>) paper using keras.

# Tessract train fonts

<https://www.youtube.com/watch?v=TpD76k2HYms>

seven segment training tesseract [youtube video](https://www.youtube.com/watch?v=J0jg1Hj2GhU)

create OCR-D training [youtube video](https://www.youtube.com/watch?v=JPDeiGc2an8&list=PLJkHpfYXMRpbljcCDRzYHTtNpmcvFNzCd&index=3)

# Vehicle detection

[Git hub](https://github.com/ablacklama/Vehicle-Detection)

Pertained model [Yolo](https://pjreddie.com/media/files/yolo.weights)

Object Detection YOLO [pyimage search](https://www.pyimagesearch.com/2018/11/12/yolo-object-detection-with-opencv/)

[Code](https://t.dripemail2.com/c/eyJhY2NvdW50X2lkIjoiNDc2ODQyOSIsImRlbGl2ZXJ5X2lkIjoicm0yY3NyNzRyeG53ejg3N2FwM2kiLCJ1cmwiOiJodHRwczovL3MzLXVzLXdlc3QtMi5hbWF6b25hd3MuY29tL3N0YXRpYy5weWltYWdlc2VhcmNoLmNvbS9vcGVuY3YteW9sby95b2xvLW9iamVjdC1kZXRlY3Rpb24uemlwP19fcz14eWVqMTFwaWl0ZGppcjVmaWRoayJ9)

## Text Summarization

[Code](https://github.com/thomasschmied/Text_Summarization_with_Tensorflow.git)

# Beuty GAN

<https://github.com/Honlan/BeautyGAN>

## Sklearn predict\_proba

clf.predict\_proba(X[:2, :])

clf.predict(X[:2, :])

model\_classes = model\_knn.classes\_

predicted = model\_knn.predict(word\_average)

score = model\_knn.predict\_proba(word\_average)

index = np.where(model\_classes == predicted[0])[0][0]

result["predicted"] = predicted[0]

result["score"] = score[0][index]

# Enable cuda

<https://developer.nvidia.com/cuda-11.0-download-archive?target_os=Linux&target_arch=x86_64&target_distro=Ubuntu&target_version=1804&target_type=deblocal>

<https://www.tensorflow.org/install/gpu>

# Social Distancing

## Proj 1

<https://www.analyticsvidhya.com/blog/2020/05/social-distancing-detection-tool-deep-learning/>

pip install cython pyyaml==5.1

pip install detectron2==0.1.3 -f <https://dl.fbaipublicfiles.com/detectron2/wheels/cu101/torch1.5/index.html>

### Error: No matching distribution found for detectron2==0.1.3

1. <https://github.com/conansherry/detectron2>
2. Detectronv1 - <https://github.com/facebookresearch/detectron2>

## from detectron2 import \_C

## ImportError: libcudart.so.10.1: cannot open shared object file: No such file or directory

Working 🡪

<https://github.com/facebookresearch/detectron2/blob/master/INSTALL.md>

### AssertionError: Torch not compiled with CUDA enabled

* conda install -c pytorch torchvision cudatoolkit=10.1 pytorch

# Proj 2

https://github.com/mithunraam99/Social-Distancing-and-Face-Mask-Detection

# Mask detection

Code: <https://towardsdatascience.com/face-mask-detection-using-yolov5-3734ca0d60d8>

Colab: <https://colab.research.google.com/github/ultralytics/yolov5/blob/master/tutorial.ipynb#scrollTo=29GJXAP_lPrt>

## Yolo – better one

<https://github.com/cansik/yolo-mask-detection>

cv2.dnn.readNetFromDarknet error: (-212:Parsing error) Unsupported activation: relu in function 'cv::dnn::darknet::ReadDarknetFromCfgStream'

<https://stackoverflow.com/a/65933792/7360872>

# Detectron windows

>pip install cython

>mkdir my\_detectron

>cd my\_detectron

>git clone <https://github.com/facebookresearch/detectron2>

> cd detectron2

>conda install torch torchvision torchaudio cudatoolkit=11.0

>pip install torch

>pip install -e .

>pip install opencv-python

>pip install scipy

>pip install torchvision



<https://www.youtube.com/watch?v=Pb3opEFP94U>

# Accident Prediction

## DBSCAN

<https://towardsdatascience.com/live-prediction-of-traffic-accident-risks-using-machine-learning-and-google-maps-d2eeffb9389e>

<https://github.com/meraldoantonio/AccidentPredictor>