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/*design plant disease detection system using CNN.
https://www.kaggle.com/datasets/kaustubhb999/tomatoleaf?resource=download*/

from tensorflow.keras.preprocessing.image import ImageDataGenerator, load_img,
img_to_array

train_dir = "./archive/tomato/train"
val_dir = "./archive/tomato/val"

img_size = 224
batch_size = 32

train_datagen = ImageDataGenerator(rescale= 1./255)
train_generator = train_datagen.flow_from_directory(train_dir, target_size =
(img_size,img_size), batch_size = batch_size, class_mode = 'categorical')

val_datagen = ImageDataGenerator(rescale= 1./255)
val_generator = val_datagen.flow_from_directory(val_dir, target_size =
(img_size,img_size), batch_size = batch_size, class_mode = 'categorical')

list(train_generator.class_indices)

from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Conv2D, MaxPooling2D, Flatten, Dense,
Dropout, BatchNormalization

model = Sequential()
model.add((Conv2D(32, (3,3), activation = 'relu', input_shape = (img_size,
img_size, 3))))
model.add(BatchNormalization())
model.add((MaxPooling2D(2,2)))
model.add((Conv2D(64, (3,3), activation = 'relu'))))
model.add(BatchNormalization())
model.add((MaxPooling2D(2,2)))
model.add((Conv2D(64, (3,3), activation = 'relu'))))
model.add(BatchNormalization())
model.add((MaxPooling2D(2,2)))
model.add((Conv2D(128, (3,3), activation = 'relu'))))
model.add(BatchNormalization())
model.add((MaxPooling2D(2,2)))
model.add(Flatten())
model.add((Dense(128, activation = 'relu'))))
model.add((Dropout(0.2)))
model.add((Dense(64, activation = 'relu'))))
model.add((Dense(train_generator.num_classes, activation = 'softmax'))))
model.summary()

model.compile(optimizer = 'adam', loss = 'categorical_crossentropy', metrics =
['accuracy'])

model.fit(train_generator, epochs = 2, validation_data= val_generator)

loss, accuracy = model.evaluate(val_generator)
print("Loss: ", loss)

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print('Accuracy', accuracy * 100)

import numpy as np
import matplotlib as plt
img_path =
"./archive/tomato/val/Tomato__Septoria_leaf_spot/0a25f893-1b5f-4845-baa1-f68ac0
3d96ac__Matt.S_CG_7863.jpg"
img = load_img(img_path, target_size = (224,224))
img_array = img_to_array(img)
img_array = np.expand_dims(img_array,axis = 0)
img_array /= 255

prediction = model.predict(img_array)
class_name = ['Tomato__Bacterial_spot',
'Tomato__Early_blight',
'Tomato__Late_blight',
'Tomato__Leaf_Mold',
'Tomato__Septoria_leaf_spot',
'Tomato__Spider_mites Two-spotted_spider_mite',
'Tomato__Target_Spot',
'Tomato__Tomato_Yellow_Leaf_Curl_Virus',
'Tomato__Tomato_mosaic_virus',
'Tomato__healthy']

predicted_class = np.argmax(prediction)
print(prediction)
print(predicted_class)
print("Class Name: ", class_name[predicted_class])

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