		Blog Home
P Data Science Tutorials		Data Science
N		Categories
Maghamenhing ning Tutorials		
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ABlguldata		4
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CNN C

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Keras

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Python Project – Traffic Signs Recognition

You must have heard about the self-driving cars in which the passenger can fully depend on the car for traveling. But to achieve level 5 autonomous, it is necessary for vehicles to understand and follow all traffic rules.

In the world of Artificial

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Intelligence and advancement ... technologies, many researchers and big companies like Tesla, Uber, Google, Mercedes-Benz, Toyota, Ford, Audi, etc are working on autonomous vehicles and selfdriving cars. So, for achieving accuracy in this technology, the vehicles should be able to interpret traffic signs and make

This is the 8th project of DataFlair's series of 20 Python projects. I recommend you to bookmark the previous projects:

decisions

accordingly.

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- 2. Parkinson's
 - **Disease**
 - **Detection**
 - **Python**
 - **Project**
- 3. Color
 - **Detection**
 - **Python**
 - **Project**
- 4. Speech
 - **Emotion**
 - Recognition
 - **Python**
 - **Project**
- 5. Breast
 - Cancer
 - Classification
 - **Python**
 - **Project**
- 6. Age and
 - Gender
 - **Detection**
 - **Python**
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- 9. <u>Driver</u>
 - **Drowsiness**
 - **Detection**
 - **Python**
 - **Project**
- 10. Traffic Signs
 - Recognition
 - Python
 - Project
- 11. Image
 - **Caption**
 - Generator
 - **Python**
 - **Project**

What is

Traffic

Signs

Recogniti

on?

There are several

different types of

traffic signs like

speed limits, no

entry, traffic

signals, turn left

or right, children

crossing, no

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passing of heavy vehicles, etc.
Traffic signs classification is the process of identifying which class a traffic sign belongs to.

Traffic Signs Recogniti on – About the Python Project

In this Python
project example,
we will build
a deep neural
network model
that can classify
traffic signs
present in the
image into
different
categories. With
this model, we
are able to read
and understand

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traffic signs
which are a very
important task for
all autonomous
vehicles.



The Dataset of Python Project

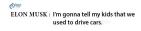
For this project, we are using the public dataset available at Kaggle:

Traffic Signs Dataset

The dataset contains more than 50,000 images of different traffic signs. It is further classified into 43 different classes. The dataset is quite varying,

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some of the classes have many images while some classes have few images. The size of the dataset is around 300 MB. The dataset has a train folder which contains images inside each class and a test folder which we will use for testing our model.





Prerequisi tes

This project
requires prior
knowledge of
Keras,
Matplotlib,
Scikit-learn,
Pandas, PIL and
image
classification.

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To install the necessary packages used for this Python data science project, enter the below command in your terminal:

1.	pip
	insta
	tenso
	keras
	sklea
	matpl
	panda

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Steps to Build the Python Project

To get started with the project, download and

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unzip the file from this link

Traffic Signs
Recognition Zip
File

And extract the files into a folder such that you will have a train, test and a meta folder.

Create a Python script file and name it traffic_signs.py in the project folder.

Our approach to building this traffic sign classification model is discussed in four steps:

• Explore the dataset

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- Build a CNN model
- Train and validate the model
- Test the model with test dataset

Step 1: Explore the dataset

Our 'train' folder contains 43 folders each representing a different class. The range of the folder is from 0 to 42. With the help of the OS module, we iterate over all the classes and append images and their respective labels in the data and labels list.

The PIL library is used to open image content into an array.

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Finally, we have stored all the images and their labels into lists (data and labels).

We need to convert the list into numpy arrays for feeding to the model.

The shape of data is (39209, 30, 30, 3) which means that there are 39,209 images of size 30×30 pixels and the last 3 means the data contains colored images (RGB value).

With the sklearn package, we use the train_test_split() method to split

training and testing data.

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From the keras.utils package, we use to_categorical method to convert the labels present in y_train and t_test into one-hot encoding.

Step 2: Build a CNN model

To classify the images into their respective categories, we will build a CNN model (Convolutional Neural Network). CNN is best for

CNN is best for image classification purposes.

The architecture of our model is.

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```
• 2 Conv2D
layer
(filter=32,
kernel_size=
(5,5),
activation="relu")
```

- MaxPool2D layer (pool_size= (2,2))
- Dropout layer (rate=0.25)
- 2 Conv2D
 layer
 (filter=64,
 kernel_size=
 (3,3),
 activation="relu")
- MaxPool2D layer (pool_size= (2,2))
- Dropout layer (rate=0.25)
- Flatten layer to squeeze the layers into 1 dimension

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- Dense Fully connected layer (256 nodes, activation="relu")
- Dropout layer (rate=0.5)
- Dense layer (43 nodes, activation="softmax")

We compile the model with Adam optimizer which performs well and loss is "categorical_crossentropy" because we have multiple classes to categorise.

Steps 3: Train and validate the model

After building the model architecture, we then train the

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model using model.fit(). I three with batch size 32 and 64. Our model performed better with 64 batch size. And after 15 epochs the accuracy was stable.

Our model got a 95% accuracy on the training dataset. With matplotlib, we plot the graph for accuracy and the loss.

Plotting Accuracy

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Accuracy and Loss
Graphs

Step 4: Test our model with test dataset

Our dataset contains a test folder and in a test.csv file, we have the details related to the image path and their respective class labels. We extract the image path and labels using pandas. Then to predict the model, we have to resize our images to 30×30 pixels and make a numpy array containing all image data. From the sklearn.metrics,

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we imported the accuracy_score and observed how our model predicted the actual labels. We achieved a 95% accuracy in this model.

In the end, we are going to save the model that we have trained using the Keras model.save() function.



Full Source code:

1.	impo
2.	impo
3.	impo
4.	impo
5.	impo
6.	from
7.	impo
8.	from
	train
9.	from

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arric 2	
10.	from load
11.	f
	Dense
12.	
13.	data
14.	labe
15.	clas
16.	cur_
	car_
17.	#Da#
18.	#Ret
19.	for
20.	
	os.pa
21.	
22.	
23.	
24.	
25.	
25.	a)
2.0	a)
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30.	
31.	
32.	
33.	
34.	#Con
35.	data
36.	labe
37.	00.00
38.	prin
	#Spl
39.	
40.	X_tr
	train
	rando
41.	
42.	prin
12	y_tra
43.	#Con
44.	
45.	y_tr
46.	y_te
47.	
48.	#Bui
49.	mode
50.	mode
	(5,5)
	input
51.	mode
	(5,5)
52.	mode
53.	mode

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Python Django Projects	+
Machine Learning Projects	+
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```
mode
54.
     3) a
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      m
     3), a
      mode
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      mode
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      mode
      mode
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      mode
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61.
      mode
62.
63.
      #Com
64.
     model
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65.
66.
      ерос
      hist
67.
     batch
     (X_te
68.
      mode
69.
      #plo
70.
71.
      plt.
      plt.
72.
     label
      plt.
73.
     label
      plt.
74.
      plt.
75.
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      plt.
      plt.
77.
      plt.
78.
79.
      plt.
80.
      plt.
81.
     label
82.
      plt.
     label
      plt.
83.
84.
      plt.
85.
      plt.
      plt.
86.
      plt.
87.
88.
      #tes
89.
      from
90.
91.
92.
      y_te
93.
      labe
94.
      imgs
95.
96.
      data
97.
98.
```

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99.	for
100.	
101.	
102.	
103.	
104.	X_te
105.	
106.	pred
107.	
108.	#Acc
109.	from
110.	prin
111.	
112.	mode

WAIT! Have you checked our latest tutorial on OpenCV & Computer Vision

Traffic Signs Classifier GUI

Now we are going to build a graphical user interface for our traffic signs classifier with Tkinter. Tkinter is a GUI toolkit in the standard python library. Make a new file in the project

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folder and copy
the below cod..
Save it as gui.py
and you can run
the code by
typing python
gui.py in the
command line.

In this file, we have first loaded the trained model 'traffic_classifier.h5' using Keras. And then we build the GUI for uploading the image and a button is used to classify which calls the classify() function. The classify() function is converting the image into the dimension of shape (1, 30, 30, 3). This is because to predict the traffic sign we have to provide the same

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dimension we have used whc... building the model. Then we predict the class, the model.predict_classes(image) returns us a number between (0-42) which represents the class it belongs to. We use the dictionary to get the information about the class. Here's the code for the gui.py file.

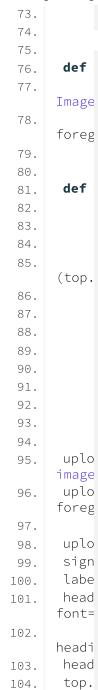
Code:

impo
from
from
from
impo
#loa
from
mode
#dic
clas

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```
20.
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30.
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32.
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41.
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50.
51.
52.
53.
54.
55.
       #ini
56.
       top=
57.
58.
       top.
       top.
59.
60.
       top.
61.
       labe
62.
      ('ari
       sign
63.
64.
65.
       def
66.
67.
68.
69.
70.
71.
```

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Output:

Summar

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Machine Learning Projects	+
Deep Learning Projects	+
AI Projects	+
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y

In this Python project with source code, we have successfully classified the traffic signs classifier with 95% accuracy and also visualized how our accuracy and loss changes with time, which is pretty good from a simple CNN model.

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```
sai
O May
2022 at 6:31
<u>pm</u>
I am
getting this
error can
anyone
help me
Traceback
(most
recent call
last):
File
"C:\Users\rsais\Traffic
sign
classification_final\Traffic
sign
classification\gui.py",
line 7, in
from
keras.models
import
load_model
File
\label{lem:converse} $$ `C:\Users\rsais\AppData\Local\Programs\Python\Python\39\\ lib\site-
packages\keras\__init__.py",
line 20, in
from.
import
initializers
File
\label{lem:converse} $$ `C:\Users\rsais\AppData\Local\Programs\Python\Python\39\\ lib\site-
packages\keras\initializers\__init__.py",
line 124, in
populate_deserializable_objects()
File
"C:\Users\rsais\AppData\Local\Programs\Python\Python39\lib\site-
```

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```
packages\keras\initializers\__init__.py",
line 82
populate_deserializable_objects
generic_utils.populate_dict_with_module_objects(
AttributeError:
module
'keras.utils.generic_utils'
has no
attribute
'populate_dict_with_module_objects'
<u>Reply</u>
```

Talha

① June 28,

2022 at

12:33 pm

what the

purpose of

meta folder

and csv

files?

Reply

Abhinav

kotnala

(J)

October

<u>15,</u>

2022 at

<u>7:25</u>

<u>am</u>

It

contains

the

data.

<u>Reply</u>

Talha

© June 28,

2022 at

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```
12:39 pm
please
share the
link to the
video if
you have
<u>Reply</u>
neon
① July 18,
2022 at
12:33 pm
Getting this
error when
running the
GUI
application
C:\Users\kidcannabis420\Project>python
gui.py
2022-07-18
09:52:41.869882:
W
tensorflow/stream_executor/platform/default/dso_loader.cc:64]
Could not
load
dynamic
library
'cudart64_110.dll';
dlerror:
cudart64_110.dll
not found
2022-07-18
09:52:41.870217:
Ι
tensorflow/stream_executor/cuda/cudart_stub.cc:29]
Ignore
above
cudart
dlerror if
```

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```
you do not
have a
GPU set up
on your
machine.
2022-07-18
09:52:51.095900:
W
tensorflow/stream_executor/platform/default/dso_loader.cc:64]
Could not
load
dynamic
library
'nvcuda.dll';
dlerror:
nvcuda.dll
not found
2022-07-18
09:52:51.096435:
tensorflow/stream_executor/cuda/cuda_driver.cc:263]
failed call
to cuInit:
UNKNOWN
ERROR
(303)
2022-07-18
09:52:51.127466:
tensorflow/stream_executor/cuda/cuda_diagnostics.cc:169]
retrieving
CUDA
diagnostic
information
for host:
DESKTOP-
OLSKNHA
2022-07-18
```

+
+
+
+
+
+
+

```
09:52:51.128581:
I
tensorflow/stream_executor/cuda/cuda_diagnostics.cc:176]
hostname:
DESKTOP-
OLSKNHA
2022-07-18
09:52:51.131056:
I
tensorflow/core/platform/cpu_feature_guard.cc:193]
This
TensorFlow
```

TensorFlow binary is

optimized

with

oneAPI

Deep

Neural

Network

Library

(oneDNN)

to use the

following

CPU

instructions

in

performance-

critical

operations:

AVX

AVX2

To enable

them in

other

operations,

rebuild

TensorFlow

with the

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```
appropriate
compil
flags.
Someone
help
<u>Reply</u>
neon
© <u>July 18,</u>
2022 at 5:53
<u>pm</u>
Someone
who has
successfully
run this
kindly
hmu,
thanks.
<u>Reply</u>
jis
© October
4, 2022 at
<u>7:41 pm</u>
while
training
getting
error,
Traceback
(most
recent call
last):
File
"traffic_sign.py",
line 108, in
#Accuracy
with the
test data
AttributeError:
```

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Machine Learning Projects	+
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```
'Sequential'
object
no attribute
'predict_classes'
can anyone
help to
resolve it
did anyone
got this
error

Reply
```

Denis

(l)

November

6, 2022 at

<u>2:14 pm</u>

you

have

to

use

'predict'

method

instead

of

'predict_classes'

<u>Reply</u>

Nick F

© October

20, 2022 at

1:32 am

predoct_class

has been

deprecated

in recent

versions of

Keras.

Replace

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Python Interview Questions	+
Python Quiz	+

```
that line
with:
model.predict_classes(X_test)
<u>Reply</u>
mike
(J)
November
13, 2022 at
6:58 pm
i faced this
error after
uploading a
photo and
clicking
classify
image:
Exception
in Tkinter
callback
Traceback
(most
recent call
last):
File
"C:\Users\T\anaconda3\lib\tkinter\__init__.py",
line 1892,
in __call__
return
self.func(*args)
File
"C:\Users\T\AppData\Local\Temp\ipykernel_191852\1463066544.py"
line 77, in
classify_b=Button(top,text="Classify
Image",command=lambda:
classify(file_path),padx=10,pady=5)
File
"C:\Users\T\AppData\Local\Temp\ipykernel_191852\1463066544.py"
```

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line 72, in

classify
sign =

classes[pred+1]

TypeError:
unhashable
type:
'numpy.ndarray'

what
should i do

Reply

emircan

(l)

November

22, 2022

at 5:04

<u>pm</u>

same

error

showing,

did

you

fixed

<u>Reply</u>

Vasanth

U

March

<u>17,</u>

<u>2023</u>

<u>at</u>

2:51

<u>pm</u>

For

model.predict_classes(X_test)

Instead

use

np.argmax(predict_x,axis=1)

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Deep Learning Projects	+
AI Projects	+
Python Interview Questions	+
Python Quiz	+

<u>Reply</u>
reCAP'ı UDA
©
November
17, 2022 at
<u>11:48 pm</u>
same error
showing
what to
do??
<u>Reply</u>
edwin
farro
©
<u>November</u>
<u>18, 2022 at</u>
<u>10:14 am</u>
Exception
in Tkinter
callback
Traceback
(most
recent call
last):
File
"C:\Program
$Files \verb WindowsApps Python Software Foundation. Python. 3.10_3.10.228$
line 1921,
incall
return
self.func(*args)
File
"e:\CURSOS
UTP\SEGUNDO
CICLO\INNOVACION
Y
TRANSFORMACION
DIGITAL\PROYECTOS
panition/ 37/41

+
+
+
+
+
+
+

```
EN
PYTH
de Señales
de
Tránsito\gui.py",
line 79, in
classify_b=Button(top,text="Clasificar
imagen",command=lambda:
classify(file_path),padx=10,pady=5)
File
"e:\CURSOS
UTP\SEGUNDO
CICLO\INNOVACION
Y
TRANSFORMACION
DIGITAL\PROYECTOS
EN
PYTHON\Reconocimiento
de Señales
de
Tránsito\gui.py",
line 72, in
classify
pred =
model.predict_classes([image])
[0]
AttributeError:
'Sequential'
object has
no attribute
'predict_classes'
Alguien me
```

<u>Reply</u>

puede

ayudar con este error

emircan

(L)

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22, 2022
at 5:03
pm
you
should
write
'predict'
only,
not
'predict_classes'
Reply

mostafa

© <u>December</u>

18, 2022 at

1:13 am

ValueError:

Classification

metrics

can't

handle a

mix of

multiclass

and

continuous-

multioutput

targets

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mima

© January

13, 2023 at

4:17 am

i have error

in tk.Tk()

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Muhammad

Imtiaz

© February

6, 2023 at

6:08 am

I'm student

of Data

Science

and

Analytics

University

of

Hertfordshire

London,

Uk. This is

very

helpful

information

for me. If a

data set

become

available

so that I

can apply

for all

things.

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