

ASSIGNMENT-3

Assignment Date	30 September 2022
Student Name	M.Vivek
Student Roll Number	962719106039
Maximum Marks	2 Marks

1. Download the Dataset

Link: https://drive.google.com/file/d/1zZ87e7GDpN90-Sa_AKbvMm3EEfQkEQ_R/view

2. Image Augmentation

Solution:

```
pwd
from tensorflow.keras.preprocessing.image import ImageDataGenerator
train_datagen=ImageDataGenerator(rescale=1./255, zoom_range=0.2, horizontal_flip=True, vertical_flip=False)
test_datagen=ImageDataGenerator(rescale=1./255)
ls
pwd
x_train=train_datagen.flow_from_directory(r"/content/drive/MyDrive/flowers", target_size=(64, 64),
                                         class_mode='categorical', batch_size=24)
x_test=test_datagen.flow_from_directory(r"/content/drive/MyDrive/flowers", target_size=(64, 64),
                                       class_mode='categorical', batch_size=24)
x_train.class_indices
```



```
Image Augmentation

[9] pwd
/content/drive/MyDrive

[10] from tensorflow.keras.preprocessing.image import ImageDataGenerator

[11] train_datagen=ImageDataGenerator(rescale=1./255, zoom_range=0.2, horizontal_flip=True, vertical_flip=False)

[12] test_datagen=ImageDataGenerator(rescale=1./255)

[13] ls
685imguf_NAD-student-registration-Process19.pdf  Flowers-Dataset.zip
Classroom/                                     'Getting started.pdf'
'Colab Notebooks'/                             'Student Registration'
flowers/                                       'Student Registration (1)

[14] pwd
/content/drive/MyDrive
```

```
FLOWERS/
SUBMIT REGISTRATION (1)

[14] pwd

'/content/drive/MyDrive'

[15] x_train=train_datagen.flow_from_directory(r"/content/drive/MyDrive/flowers",target_size=(64,64),
class_mode='categorical',batch_size=24)

Found 4317 images belonging to 6 classes.

[16] x_test=test_datagen.flow_from_directory(r"/content/drive/MyDrive/flowers",target_size=(64,64),
class_mode='categorical',batch_size=24)

Found 4317 images belonging to 6 classes.

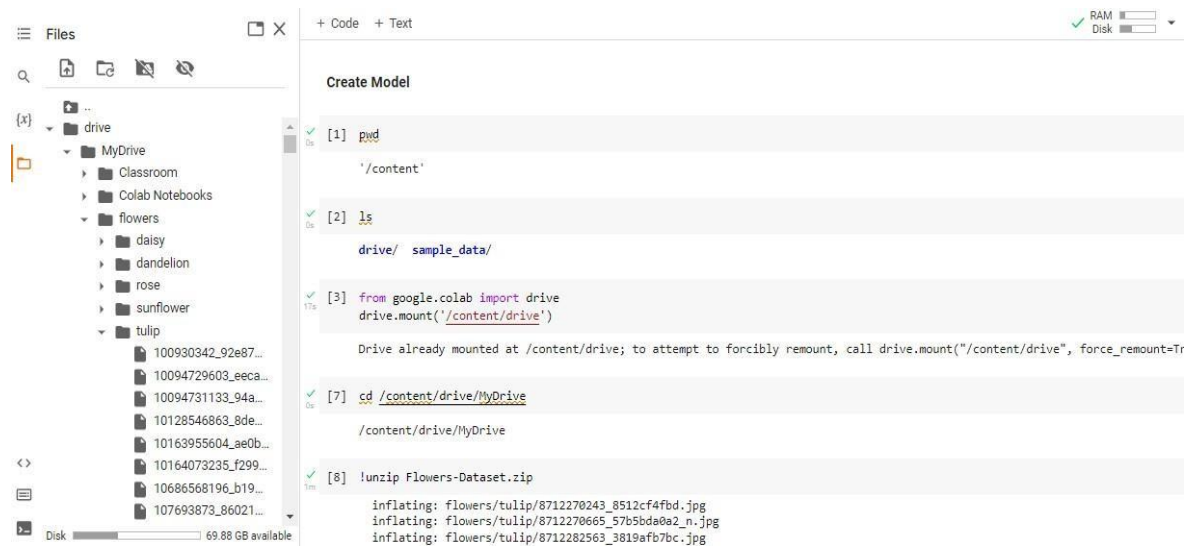
[18] x_train.class_indices

{'_ipybnb_checkpoints': 0,
'daisy': 1,
'dandelion': 2,
'rose': 3,
'sunflower': 4,
'tulip': 5}
```

3.Create Model

Solution:

```
pwd
ls
from google.colab import drive
drive.mount('/content/drive')
cd /content/drive/MyDrive
!unzip Flowers-Dataset.zip
```



The screenshot shows the Google Colab interface. On the left, the 'Files' pane displays a directory tree with 'drive' containing 'MyDrive', which includes 'Classroom', 'Colab Notebooks', 'flowers' (with subfolders 'daisy', 'dandelion', 'rose', 'sunflower', 'tulip'), and 'tulip' (containing several image files). The main area shows a code editor with the following code:

```
Create Model

[1] pwd

'/content'

[2] ls

drive/ sample_data/

[3] from google.colab import drive
drive.mount('/content/drive')

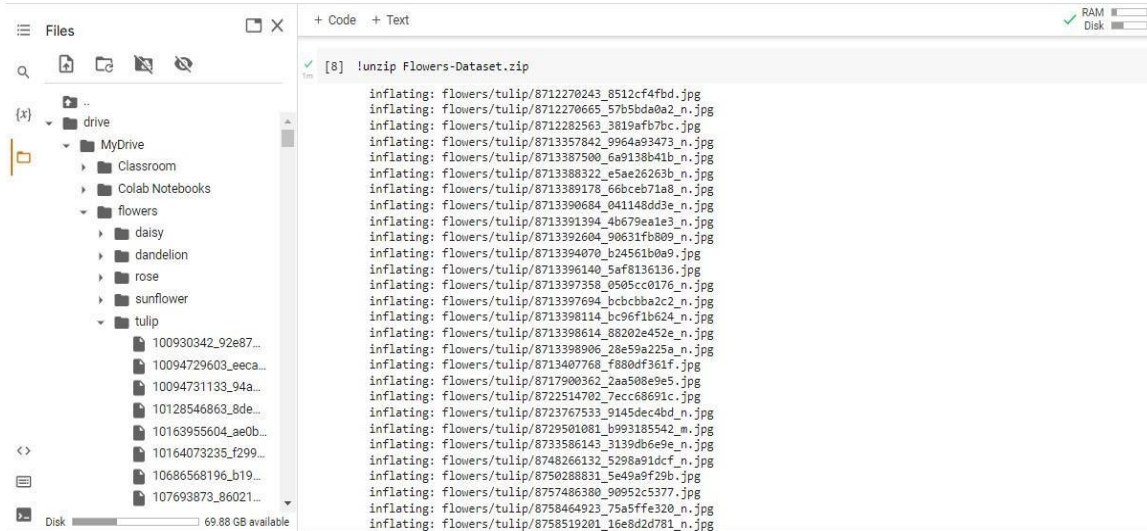
Drive already mounted at /content/drive; to attempt to forcibly remount, call drive.mount("/content/drive", force_remount=True)

[7] cd /content/drive/MyDrive

/content/drive/MyDrive

[8] !unzip Flowers-Dataset.zip

inflating: flowers/tulip/8712270243_8512cf4fbd.jpg
inflating: flowers/tulip/8712270665_57b5bda0a2_n.jpg
inflating: flowers/tulip/8712282563_3819afb7bc.jpg
```



4. Add Layers(Convolution,Maxpooling,Flatten,Dense-(Hidden Layers),Output)

Solution:

```
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense,Convolution2D,MaxPooling2D,Flatten
model=Sequential()
model.add(Convolution2D(32,(3,3),input_shape=(64,64,3),activation='relu'))
model.add(MaxPooling2D(pool_size=(2,2)))
model.add(Flatten())
model.summary()
32*(3*3*3+1)
```

Hidden layer

```
model.add(Dense(300,activation='relu'))
model.add(Dense(150,activation='relu'))
```

Output layer

```
model.add(Dense(4,activation='softmax'))
```



The image displays two screenshots of a Jupyter Notebook interface, showing the construction of a Keras model for image classification.

Left Screenshot:

- Files Panel:** Shows a directory structure with folders like "Classroom", "Colab Notebooks", "flowers", "daisy", "dandelion", "rose", "sunflower", and "tulip".
- Code Cell [24]:** Contains the command `model.summary()`. The output shows the model architecture:

Layer (type)	Output Shape	Param #
conv2d (Conv2D)	(None, 62, 62, 32)	896
max_pooling2d (MaxPooling2D)	(None, 31, 31, 32)	0
flatten (Flatten)	(None, 30752)	0

 The summary also indicates: Total params: 896, Trainable params: 896, Non-trainable params: 0.
- Code Cell [25]:** Contains the calculation `32*(3*3*3+1)`, resulting in 896, labeled as "Hidden Layers".
- Code Cell [26]:** Contains the command `model.add(Dense(300,activation='relu'))`.

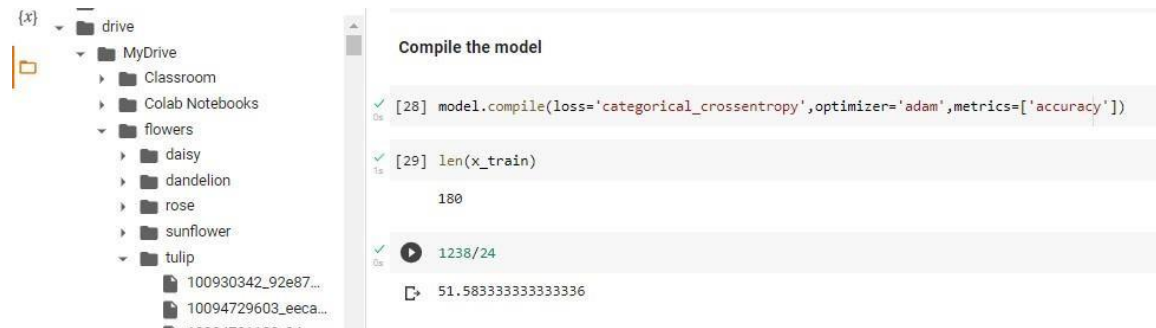
Right Screenshot:

- Code Cell [25]:** Shows the calculation `32*(3*3*3+1)` resulting in 896, labeled as "Hidden Layers".
- Code Cell [26]:** Contains the commands `model.add(Dense(300,activation='relu'))` and `model.add(Dense(150,activation='relu'))`, labeled as "Output Layers".
- Code Cell [27]:** Contains the command `model.add(Dense(4,activation='softmax'))`, labeled as "Compile the model".
- Code Cell [28]:** Contains the command `model.compile(loss='categorical_crossentropy',optimizer='adam',metrics=['accuracy'])`.
- Code Cell [29]:** Contains the command `len(x_train)`, resulting in 180.

5. Compile The Model

Solution:

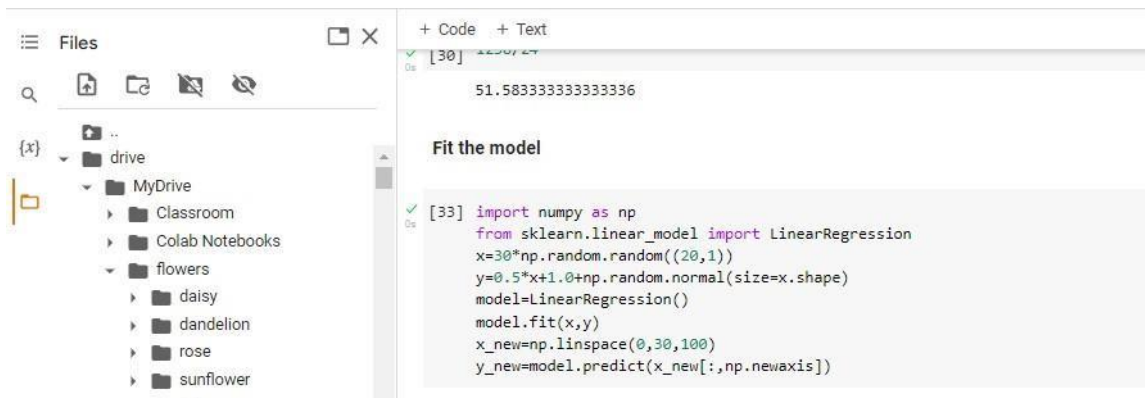
```
model.compile(loss='categorical_crossentropy',optimizer='adam',metrics=['accuracy'])
len(x_train)
1238/24
```



6. Fit The Model

Solution:

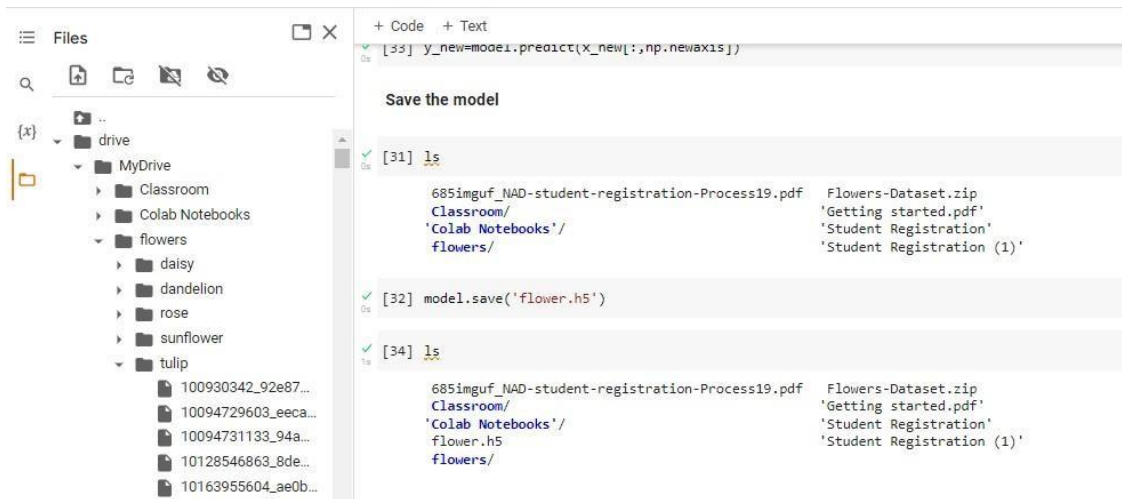
```
import numpy as np
from sklearn.linear_model import LinearRegression
x=30*np.random.random((20,1))
y=0.5*x+1.0+np.random.normal(size=x.shape)
model=LinearRegression()
model.fit(x,y)
x_new=np.linspace(0,30,100)
y_new=model.predict(x_new[:,np.newaxis])
```



7. Save The Model

Solution:

```
ls
model.save('flower.h5')
ls
```



8. Test The Model

Solution:

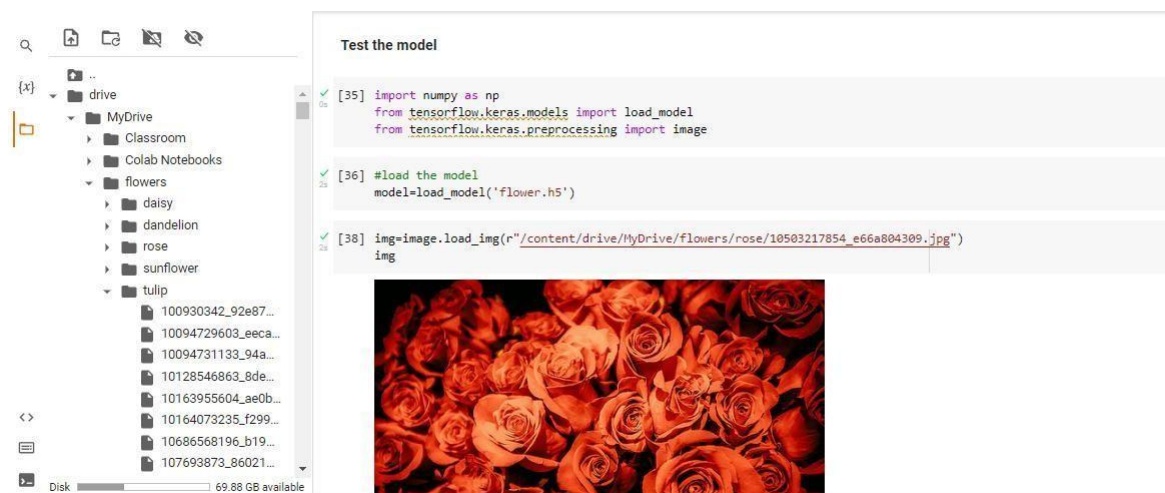
```
import numpy as np
from tensorflow.keras.models import load_model
from tensorflow.keras.preprocessing import image
#load the model
model=load_model('flower.h5')
img=image.load_img(r"/content/drive/MyDrive/flowers/rose/10503217854_e66a804309.jpg")
img
img=image.load_img(r"/content/drive/MyDrive/flowers/rose/10503217854_e66a804309.jpg",t
target_size=(64, 64))
img
x=image.img_to_array(img)
x
x=np.expand_dims(x,axis=0)
x
y=np.argmax(model.predict(x),axis=1)
y
x_train.class_indices
index=['daisy','dandelion','rose','sunflower','tulip']
index[y[0]]
```

```
img=image.load_img(r"/content/drive/MyDrive/flowers/daisy/100080576_f52e8ee070_n.jpg",
target_size=(64, 64))
x=image.img_to_array(img)
x=np.expand_dims(x,axis=0)
y=np.argmax(model.predict(x),axis=1)
index=['daisy','dandelion','rose','sunflower','tulip']
index[y[0]]
```

```
img=image.load_img(r"/content/drive/MyDrive/flowers/dandelion/10043234166_e6dd915111_n
.jpg",target_size=(64, 64))
```

```
img=image.load_img(r"/content/drive/MyDrive/flowers/rose/10090824183_d02c613f10_m.jpg",
target_size=(64,64))
x=image.img_to_array(img)
x=np.expand_dims(x,axis=0)
y=np.argmax(model.predict(x),axis=1)
index=['daisy','dandelion','rose','sunflower','tulip']
index[y[0]]
```


```
img=image.load_img(r"/content/drive/MyDrive/flowers/tulip/100930342_92e8746431_n.jpg",
target_size=(64,64))
x=image.img_to_array(img)
x=np.expand_dims(x,axis=0)
y=np.argmax(model.predict(x),axis=1)
index=['daisy','dandelion','rose','sunflower','tulip']
index[y[0]]
```



Files + Code + Text RAM Disk Edit

drive
MyDrive
Classroom
Colab Notebooks
flowers
daisy
dandelion
rose
sunflower
tulip
100930342_92e87...
10094729603_eeca...
10094731133_94a...
10128546863_8de...
10163955604_ae0b...
10164073235_f299...
10686568196_b19...
107693873_86021...

15 [39] img=image.load_img(r"/content/drive/MyDrive/flowers/rose/10503217854_e66a804309.jpg",target_size=(64,64))
img



15 [40] x=image.img_to_array(img)
x

```
array([[[[ 0.,  2.,  0.],  
         [ 0.,  2.,  0.],  
         [ 0.,  2.,  0.],  
         ...,  
         [ 92., 14.,  0.],  
         [ 61., 13.,  9.],  
         [ 17.,  7.,  5.]],  
       [[ 0.,  2.,  0.],  
         [ 0.,  2.,  0.],  
         [ 0.,  2.,  0.],  
         ...,  
         [150.,  3.,  0.],  
         [ 85., 10.,  7.],  
         [119.,  4.,  1.]],  
       [[ 0.,  2.,  0.],  
         [ 0.,  2.,  0.],  
         [ 0.,  2.,  0.],  
         ...,  
         [150.,  3.,  0.],  
         [ 85., 10.,  7.],  
         [119.,  4.,  1.]]], dtype=float32)]
```

Files + Code + Text RAM Disk Edit

drive
MyDrive
Classroom
Colab Notebooks
flowers
daisy
dandelion
rose
sunflower
tulip
100930342_92e87...
10094729603_eeca...
10094731133_94a...
10128546863_8de...
10163955604_ae0b...
10164073235_f299...
10686568196_b19...
107693873_86021...

15 [40] [[0., 2., 0.],
 [0., 2., 0.],
 [1., 1., 0.],
 ...,
 [29., 5., 1.],
 [41., 13., 0.],
 [5., 4., 0.]], dtype=float32)

15 [41] x=np.expand_dims(x,axis=0)
x

```
array([[[[ 0.,  2.,  0.],  
         [ 0.,  2.,  0.],  
         [ 0.,  2.,  0.],  
         ...,  
         [ 92., 14.,  0.],  
         [ 61., 13.,  9.],  
         [ 17.,  7.,  5.]],  
       [[ 0.,  2.,  0.],  
         [ 0.,  2.,  0.],  
         [ 0.,  2.,  0.],  
         ...,  
         [150.,  3.,  0.],  
         [ 85., 10.,  7.],  
         [119.,  4.,  1.]],  
       [[ 0.,  2.,  0.],  
         [ 0.,  2.,  0.],  
         [ 0.,  2.,  0.],  
         ...,  
         [150.,  3.,  0.],  
         [ 85., 10.,  7.],  
         [119.,  4.,  1.]]], dtype=float32)]
```



```
{x} drive
  MyDrive
    Classroom
    Colab Notebooks
    flowers
      daisy
      dandelion
      rose
      sunflower
      tulip
        100930342_92e87...
        10094729603_eeca...
        10094731133_94a...
        10128546863_8de...
        10163955604_ae0b...
        10164073235_f299...
        10686568196_b19...
        107693873_86021...

[42] y=np.argmax(model.predict(x),axis=1)
y
array([3])

[43] x_train.class_indices
{'_ipynb_checkpoints': 0,
 'daisy': 1,
 'dandelion': 2,
 'rose': 3,
 'sunflower': 4,
 'tulip': 5}

[44] index=['daisy','dandelion','rose','sunflower','tulip']

[46] index[y[0]]
'sunflower'

[50] img=image.load_img(r"/content/drive/MyDrive/flowers/daisy/100080576_f52e8ee070_n.jpg",target_size=(64,64))
x=image.img_to_array(img)
```

```
Files
  drive
    MyDrive
      Classroom
      Colab Notebooks
      flowers
        daisy
        dandelion
        rose
        sunflower
        tulip
          100930342_92e87...
          10094729603_eeca...
          10094731133_94a...
          10128546863_8de...
          10163955604_ae0b...
          10164073235_f299...
          10686568196_b19...
          107693873_86021...

+ Code + Text
[50] img=image.load_img(r"/content/drive/MyDrive/flowers/daisy/100080576_f52e8ee070_n.jpg",target_size=(64,64))
x=image.img_to_array(img)
x=np.expand_dims(x,axis=0)
y=np.argmax(model.predict(x),axis=1)
index=['daisy','dandelion','rose','sunflower','tulip']
index[y[0]]
'sunflower'

[51] img=image.load_img(r"/content/drive/MyDrive/flowers/dandelion/10043234166_e6dd915111_n.jpg",target_size=(64,64))
x=image.img_to_array(img)
x=np.expand_dims(x,axis=0)
y=np.argmax(model.predict(x),axis=1)
index=['daisy','dandelion','rose','sunflower','tulip']
index[y[0]]
'rose'

[52] img=image.load_img(r"/content/drive/MyDrive/flowers/rose/10090824183_d02c613f10_m.jpg",target_size=(64,64))
x=image.img_to_array(img)
x=np.expand_dims(x,axis=0)
y=np.argmax(model.predict(x),axis=1)
index=['daisy','dandelion','rose','sunflower','tulip']
index[y[0]]
'sunflower'
```

```
Files
  drive
    MyDrive
      Classroom
      Colab Notebooks
      flowers
        daisy
        dandelion
        rose
        sunflower
        tulip
          100930342_92e87...
          10094729603_eeca...
          10094731133_94a...
          10128546863_8de...
          10163955604_ae0b...
          10164073235_f299...
          10686568196_b19...
          107693873_86021...

+ Code + Text
img=image.load_img(r"/content/drive/MyDrive/flowers/sunflower/1000000420_094707604_n.jpg",target_size=(64,64))
x=image.img_to_array(img)
x=np.expand_dims(x,axis=0)
y=np.argmax(model.predict(x),axis=1)
index=['daisy','dandelion','rose','sunflower','tulip']
index[y[0]]
'rose'

[54] img=image.load_img(r"/content/drive/MyDrive/flowers/tulip/100930342_92e8746431_n.jpg",target_size=(64,64))
x=image.img_to_array(img)
x=np.expand_dims(x,axis=0)
y=np.argmax(model.predict(x),axis=1)
index=['daisy','dandelion','rose','sunflower','tulip']
index[y[0]]
'dandelion'
```