

KSR College Of Engineering , Tiruchengode

Department of Information Technology

NALAIYA THIRAN

AI ASSESSMENT- 3

```
{
  "nbformat": 4,
  "nbformat_minor": 0,
  "metadata": {
    "colab": {
      "provenance": [],
      "collapsed_sections": []
    },
    "kernelspec": {
      "name": "python3",
      "display_name": "Python 3"
    },
    "language_info": {
      "name": "python"
    }
  },
  "cells": [
    {
      "cell_type": "markdown",
      "source": [
        "# **Assignment 3**"
      ],
      "metadata": {
```

```
    "id": "j8bF22iNxMDx"
  }
},
{
  "cell_type": "markdown",
  "source": [
    "# **CNN MODEL FOR FLOWER CLASSIFICATION**\n",
    "# **Trained by Team ID : PNT2022TMID17050**"
  ],
  "metadata": {
    "id": "BdPpvl8Q0IIY"
  }
},
{
  "cell_type": "markdown",
  "source": [
    "# **Pre-Requisites**"
  ],
  "metadata": {
    "id": "d5mO5lxMq9BQ"
  }
},
{
  "cell_type": "code",
  "execution_count": 1,
  "metadata": {
    "colab": {
      "base_uri": "https://localhost:8080/"
    },
    "id": "h4l4dfJ6p3kx",
    "outputId": "5605b9f7-ebc0-4587-88c6-268194f1335d"
```

```

},
"outputs": [
  {
    "output_type": "stream",
    "name": "stdout",
    "text": [
      "Drive already mounted at /content/drive; to attempt to forcibly remount, call\n",
      "drive.mount('/content/drive', force_remount=True).\\n"
    ]
  }
],
"source": [
  "from google.colab import drive\\n",
  "drive.mount('/content/drive')\\n"
],
},
{
  "cell_type": "markdown",
  "source": [
    "# **STEP 1 UNZIP FILES**"
  ],
  "metadata": {
    "id": "B4Kss5zOrXUz"
  }
},
{
  "cell_type": "code",
  "source": [
    "cd/content/drive/MyDrive/AI_IBM"
  ],
  "metadata": {

```

```
"colab": {
  "base_uri": "https://localhost:8080/"
},
"id": "DRNhAxivrWKc",
"outputId": "f1a087a8-6f33-4d81-ff79-e50f4c1ff623"
},
"execution_count": 2,
"outputs": [
  {
    "output_type": "stream",
    "name": "stdout",
    "text": [
      "/content/drive/MyDrive/AI_IBM\n"
    ]
  }
],
{
  "cell_type": "code",
  "source": [
    "!unzip Flowers-Dataset.zip"
  ],
  "metadata": {
    "colab": {
      "base_uri": "https://localhost:8080/"
    },
    "id": "B_hJ27NKRhKz",
    "outputId": "9b319781-61d1-4a0e-ea93-f279d067bfc7"
  },
  "execution_count": 3,
  "outputs": [
```

```

{
  "output_type": "stream",
  "name": "stdout",
  "text": [
    "Archive: Flowers-Dataset.zip\n",
    "replace flowers/daisy/100080576_f52e8ee070_n.jpg? [y]es, [n]o, [A]ll, [N]one, [r]ename:
N\n"
  ]
}
],
{
  "cell_type": "markdown",
  "source": [
    "# **STEP 2 Image** **Augmentation**"
  ],
  "metadata": {
    "id": "hvG8h70rrphq"
  }
},
{
  "cell_type": "code",
  "source": [
    "from tensorflow.keras.preprocessing.image import ImageDataGenerator"
  ],
  "metadata": {
    "id": "itQt2Ad8rtk8"
  },
  "execution_count": 4,
  "outputs": []
},

```

```

{
  "cell_type": "code",
  "source": [
    "train_datagen=ImageDataGenerator(rescale=1./255,
zoom_range=0.2,horizontal_flip=True,vertical_flip=False)"
  ],
  "metadata": {
    "id": "9yZUiTxnr0UN"
  },
  "execution_count": 5,
  "outputs": []
},
{
  "cell_type": "code",
  "source": [
    "test_datagen=ImageDataGenerator(rescale=1./255)"
  ],
  "metadata": {
    "id": "zD7ristVr3F3"
  },
  "execution_count": 6,
  "outputs": []
},
{
  "cell_type": "code",
  "source": [
"x_train=train_datagen.flow_from_directory(r\"/content/drive/MyDrive/AI_IBM/flowers\",target_si
ze=(64,64),class_mode='categorical',batch_size=24)"
  ],
  "metadata": {
    "colab": {

```

```

    "base_uri": "https://localhost:8080/"
  },
  "id": "BjQo5zGHuHN4",
  "outputId": "d3d1e296-e74d-4e52-cce8-8d26459d10f1"
},
"execution_count": 7,
"outputs": [
  {
    "output_type": "stream",
    "name": "stdout",
    "text": [
      "Found 4317 images belonging to 5 classes.\n"
    ]
  }
],
{
  "cell_type": "code",
  "source": [
    "x_test=test_datagen.flow_from_directory(r\"/content/drive/MyDrive/AI_IBM/flowers\",target_size\n\n=(64,64),class_mode='categorical',batch_size=24)"
  ],
  "metadata": {
    "colab": {
      "base_uri": "https://localhost:8080/"
    },
    "id": "e4YJwWrCukDq",
    "outputId": "e71a3e44-6642-4592-fa96-7af9c6edb08f"
  },
  "execution_count": 8,
  "outputs": [

```

```
{
  "output_type": "stream",
  "name": "stdout",
  "text": [
    "Found 4317 images belonging to 5 classes.\n"
  ]
}
],
{
  "cell_type": "code",
  "source": [
    "x_train.class_indices"
  ],
  "metadata": {
    "colab": {
      "base_uri": "https://localhost:8080/"
    },
    "id": "EgBhHHYTuv4X",
    "outputId": "8a9f62e0-7d2b-4138-c5ce-4ca16b78fbd1"
  },
  "execution_count": 9,
  "outputs": [
    {
      "output_type": "execute_result",
      "data": {
        "text/plain": [
          "'{'daisy': 0, 'dandelion': 1, 'rose': 2, 'sunflower': 3, 'tulip': 4}'"
        ]
      },
      "metadata": {}
    }
  ]
}
```



```
    "execution_count": 9
  }
]
},
{
  "cell_type": "markdown",
  "source": [
    "# **Step -3 Initializing CNN And Create Model**"
  ],
  "metadata": {
    "id": "O5cz-9qOJM_s"
  }
},
{
  "cell_type": "code",
  "source": [
    "from tensorflow.keras.models import Sequential\n",
    "from tensorflow.keras.layers import Dense,Convolution2D,MaxPooling2D,Flatten"
  ],
  "metadata": {
    "id": "QAUHi2otRcoC"
  },
  "execution_count": 10,
  "outputs": []
},
{
  "cell_type": "markdown",
  "source": [
    "# **Step -4 Add layers**"
  ],
  "metadata": {
```

```
    "id": "xew7skua3a0z"
  }
},
{
  "cell_type": "code",
  "source": [
    "model=Sequential()"
  ],
  "metadata": {
    "id": "dack9NXyR2t6"
  },
  "execution_count": 11,
  "outputs": []
},
{
  "cell_type": "markdown",
  "source": [
    "# **4.1 Input Layers (Convolution ,MaxPooling,Flatten)**"
  ],
  "metadata": {
    "id": "SzlvL8Q52DFR"
  }
},
{
  "cell_type": "code",
  "source": [
    "model.add(Convolution2D(32,(3,3),input_shape=(64,64,3),activation='relu'))"
  ],
  "metadata": {
    "id": "qPUbKxHGR7EX"
  },
}
```

```
"execution_count": 12,
"outputs": []
},
{
  "cell_type": "code",
  "source": [
    "model.add(MaxPooling2D(pool_size=(2,2)))"
  ],
  "metadata": {
    "id": "IBGMZ7sSSAIB"
  },
  "execution_count": 13,
  "outputs": []
},
{
  "cell_type": "code",
  "source": [
    "model.add(Flatten())"
  ],
  "metadata": {
    "id": "c65fXm9KSErL"
  },
  "execution_count": 14,
  "outputs": []
},
{
  "cell_type": "code",
  "source": [
    "model.summary()"
  ],
  "metadata": {
```

```

"colab": {
  "base_uri": "https://localhost:8080/"
},
"id": "-go5E-VbSlau",
"outputId": "1f46f35d-1950-4456-bce9-16a06053d40f"
},
"execution_count": 15,
"outputs": [
  {
    "output_type": "stream",
    "name": "stdout",
    "text": [
      "Model: \"sequential\\n\",
      \"
      Layer (type)      Output Shape      Param #   \",
      \"=====\\n\",
      \" conv2d (Conv2D)    (None, 62, 62, 32)   896      \",
      \"                      \",
      \" max_pooling2d (MaxPooling2D) (None, 31, 31, 32)   0        \",
      \" )                      \",
      \"                      \",
      \" flatten (Flatten)    (None, 30752)        0        \",
      \"                      \",
      \"=====\\n\",
      \"Total params: 896\\n\",
      \"Trainable params: 896\\n\",
      \"Non-trainable params: 0\\n\",
      \"
    ]
  }
]

```

```
},
{
  "cell_type": "markdown",
  "source": [
    "# **4.2 Hidden Layers**"
  ],
  "metadata": {
    "id": "f4ZSQPIFJaeb"
  }
},
{
  "cell_type": "code",
  "source": [
    "model.add(Dense(300,activation='relu'))\n",
    "model.add(Dense(150,activation='relu'))"
  ],
  "metadata": {
    "id": "x8MIUG1PSZ21"
  },
  "execution_count": 16,
  "outputs": []
},
{
  "cell_type": "markdown",
  "source": [
    "# **4.3 Output Layers**"
  ],
  "metadata": {
    "id": "PNLk8KHHJf3K"
  }
},
```

```
{
  "cell_type": "code",
  "source": [
    "model.add(Dense(5,activation='softmax'))"
  ],
  "metadata": {
    "id": "grIOIbuwSeqO"
  },
  "execution_count": 17,
  "outputs": []
},
{
  "cell_type": "code",
  "source": [
    "model.compile(loss='categorical_crossentropy',optimizer='adam',metrics=['accuracy'])"
  ],
  "metadata": {
    "id": "l44vMW4QShaw"
  },
  "execution_count": 18,
  "outputs": []
},
{
  "cell_type": "code",
  "source": [
    "len(x_train)"
  ],
  "metadata": {
    "colab": {
      "base_uri": "https://localhost:8080/"
    }
  },
  "execution_count": 19,
  "outputs": [
    {
      "output_type": "text",
      "text": "10000"
    }
  ]
}
```

```
"id": "Beiar4NESkL4",
"outputId": "4b264b09-51b5-4786-b2a8-d60ac129229d"
},
"execution_count": 19,
"outputs": [
  {
    "output_type": "execute_result",
    "data": {
      "text/plain": [
        "180"
      ]
    },
    "metadata": {},
    "execution_count": 19
  }
],
{
  "cell_type": "markdown",
  "source": [
    "# **Step -5 Train the Model**"
  ],
  "metadata": {
    "id": "Y9f3EISv3Nc6"
  }
},
{
  "cell_type": "code",
  "source": [
    "model.fit_generator(x_train,steps_per_epoch=len(x_train), validation_data=x_test,
validation_steps=len(x_test), epochs= 30)"
```

```

],
"metadata": {
  "colab": {
    "base_uri": "https://localhost:8080/"
  },
  "id": "ATt0m5Cv6R-w",
  "outputId": "734d2b05-c864-450f-a46f-8ce129904306"
},
"execution_count": 20,
"outputs": [
  {
    "output_type": "stream",
    "name": "stderr",
    "text": [
      "/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:1: UserWarning:
`Model.fit_generator` is deprecated and will be removed in a future version. Please use `Model.fit`,
which supports generators.\n",
      "\n\nEntry point for launching an IPython kernel.\n"
    ]
  },
  {
    "output_type": "stream",
    "name": "stdout",
    "text": [
      "Epoch 1/30\n",
      "180/180 [=====] - 393s 2s/step - loss: 1.3213 - accuracy:
0.4714 - val_loss: 1.1275 - val_accuracy: 0.5532\n",
      "Epoch 2/30\n",
      "180/180 [=====] - 74s 409ms/step - loss: 1.0600 - accuracy:
0.5854 - val_loss: 0.9406 - val_accuracy: 0.6301\n",
      "Epoch 3/30\n",
      "180/180 [=====] - 73s 405ms/step - loss: 0.9678 - accuracy:
0.6247 - val_loss: 0.9603 - val_accuracy: 0.6203\n",

```


"Epoch 4/30\n",
"180/180 [=====] - 77s 429ms/step - loss: 0.8884 - accuracy:
0.6546 - val_loss: 0.8187 - val_accuracy: 0.6938\n",
"Epoch 5/30\n",
"180/180 [=====] - 76s 422ms/step - loss: 0.8358 - accuracy:
0.6787 - val_loss: 0.7393 - val_accuracy: 0.7225\n",
"Epoch 6/30\n",
"180/180 [=====] - 75s 418ms/step - loss: 0.7924 - accuracy:
0.6965 - val_loss: 0.8389 - val_accuracy: 0.6928\n",
"Epoch 7/30\n",
"180/180 [=====] - 73s 405ms/step - loss: 0.7521 - accuracy:
0.7158 - val_loss: 0.8503 - val_accuracy: 0.6789\n",
"Epoch 8/30\n",
"180/180 [=====] - 74s 411ms/step - loss: 0.7048 - accuracy:
0.7313 - val_loss: 0.6492 - val_accuracy: 0.7521\n",
"Epoch 9/30\n",
"180/180 [=====] - 72s 400ms/step - loss: 0.6502 - accuracy:
0.7521 - val_loss: 0.6458 - val_accuracy: 0.7438\n",
"Epoch 10/30\n",
"180/180 [=====] - 74s 409ms/step - loss: 0.6182 - accuracy:
0.7684 - val_loss: 0.5721 - val_accuracy: 0.7818\n",
"Epoch 11/30\n",
"180/180 [=====] - 72s 402ms/step - loss: 0.5662 - accuracy:
0.7931 - val_loss: 0.5968 - val_accuracy: 0.7725\n",
"Epoch 12/30\n",
"180/180 [=====] - 72s 401ms/step - loss: 0.5600 - accuracy:
0.7908 - val_loss: 0.6907 - val_accuracy: 0.7612\n",
"Epoch 13/30\n",
"180/180 [=====] - 72s 399ms/step - loss: 0.5064 - accuracy:
0.8138 - val_loss: 0.5185 - val_accuracy: 0.8117\n",
"Epoch 14/30\n",
"180/180 [=====] - 71s 394ms/step - loss: 0.4830 - accuracy:
0.8249 - val_loss: 0.3613 - val_accuracy: 0.8673\n",
"Epoch 15/30\n",

"180/180 [=====] - 71s 397ms/step - loss: 0.4650 - accuracy: 0.8196 - val_loss: 0.3396 - val_accuracy: 0.8768\n",
"Epoch 16/30\n",
"180/180 [=====] - 71s 393ms/step - loss: 0.4117 - accuracy: 0.8559 - val_loss: 0.3472 - val_accuracy: 0.8738\n",
"Epoch 17/30\n",
"180/180 [=====] - 71s 397ms/step - loss: 0.3892 - accuracy: 0.8631 - val_loss: 0.3314 - val_accuracy: 0.8826\n",
"Epoch 18/30\n",
"180/180 [=====] - 70s 389ms/step - loss: 0.3441 - accuracy: 0.8726 - val_loss: 0.4008 - val_accuracy: 0.8589\n",
"Epoch 19/30\n",
"180/180 [=====] - 73s 404ms/step - loss: 0.3467 - accuracy: 0.8719 - val_loss: 0.2484 - val_accuracy: 0.9060\n",
"Epoch 20/30\n",
"180/180 [=====] - 72s 398ms/step - loss: 0.3327 - accuracy: 0.8758 - val_loss: 0.2234 - val_accuracy: 0.9210\n",
"Epoch 21/30\n",
"180/180 [=====] - 73s 403ms/step - loss: 0.2807 - accuracy: 0.9009 - val_loss: 0.2830 - val_accuracy: 0.9036\n",
"Epoch 22/30\n",
"180/180 [=====] - 70s 392ms/step - loss: 0.2751 - accuracy: 0.9013 - val_loss: 0.2392 - val_accuracy: 0.9141\n",
"Epoch 23/30\n",
"180/180 [=====] - 73s 404ms/step - loss: 0.2549 - accuracy: 0.9097 - val_loss: 0.2221 - val_accuracy: 0.9189\n",
"Epoch 24/30\n",
"180/180 [=====] - 72s 399ms/step - loss: 0.2412 - accuracy: 0.9243 - val_loss: 0.2029 - val_accuracy: 0.9291\n",
"Epoch 25/30\n",
"180/180 [=====] - 72s 402ms/step - loss: 0.2360 - accuracy: 0.9199 - val_loss: 0.1965 - val_accuracy: 0.9307\n",
"Epoch 26/30\n",
"180/180 [=====] - 72s 401ms/step - loss: 0.2199 - accuracy: 0.9201 - val_loss: 0.1919 - val_accuracy: 0.9331\n",

```

    "Epoch 27/30\n",
    "180/180 [=====] - 72s 400ms/step - loss: 0.2008 - accuracy:
0.9363 - val_loss: 0.1218 - val_accuracy: 0.9560\n",
    "Epoch 28/30\n",
    "180/180 [=====] - 73s 406ms/step - loss: 0.1889 - accuracy:
0.9310 - val_loss: 0.2838 - val_accuracy: 0.9108\n",
    "Epoch 29/30\n",
    "180/180 [=====] - 70s 389ms/step - loss: 0.2046 - accuracy:
0.9275 - val_loss: 0.2116 - val_accuracy: 0.9307\n",
    "Epoch 30/30\n",
    "180/180 [=====] - 70s 392ms/step - loss: 0.1886 - accuracy:
0.9372 - val_loss: 0.2091 - val_accuracy: 0.9280\n"
]
},
{
    "output_type": "execute_result",
    "data": {
        "text/plain": [
            "<keras.callbacks.History at 0x7f3e15438e50>"
        ]
    },
    "metadata": {},
    "execution_count": 20
}
]
},
{
    "cell_type": "markdown",
    "source": [
        "# **Step -6 Save The model**"
    ],
    "metadata": {

```

```
    "id": "1uK880jw9Kru"
  }
},
{
  "cell_type": "code",
  "source": [
    "model.save('Flowers_classification_model1.h5')"
  ],
  "metadata": {
    "id": "scoaKurE9FZk"
  },
  "execution_count": 21,
  "outputs": []
},
{
  "cell_type": "markdown",
  "source": [
    "# **Step -7 Test The model**"
  ],
  "metadata": {
    "id": "YAH2UVpi9RMV"
  }
},
{
  "cell_type": "code",
  "source": [
    "ls"
  ],
  "metadata": {
    "colab": {
      "base_uri": "https://localhost:8080/"
    }
  }
}
```

```

    },
    "id": "Z-co6hBAEmzg",
    "outputId": "bf8a661d-3210-4695-dcb7-48e6f365dfce"
  },
  "execution_count": 22,
  "outputs": [
    {
      "output_type": "stream",
      "name": "stdout",
      "text": [
        "\u001b[0m\u001b[01;34mflowers\u001b[0m/ Flowers_classification_model1.h5 Flowers-
Dataset.zip video.mp4\n"
      ]
    }
  ],
},
{
  "cell_type": "code",
  "source": [
    "import numpy as np\n",
    "from tensorflow.keras.models import load_model\n",
    "from tensorflow.keras.preprocessing import image"
  ],
  "metadata": {
    "id": "mJvRRo7VvkeO"
  },
  "execution_count": 23,
  "outputs": []
},
{
  "cell_type": "code",

```

```

"source": [
  "# Load the model\n",
  "model=load_model('Flowers_classification_model1.h5')",
],
"metadata": {
  "id": "xo6F_4jw9KBZ"
},
"execution_count": 24,
"outputs": []
},
{
  "cell_type": "code",
  "source": [
    "img=image.load_img(r\"/content/s3.jpg\",target_size=(64,64))\n",
    "x=image.img_to_array(img)\n",
    "x=np.expand_dims(x,axis=0)\n",
    "y=np.argmax(model.predict(x),axis=1)\n",
    "# x_train.class_indices\n",
    "index=['daisy','dandelion','rose','sunflower','tulip']\n",
    "index[y[0]]"
  ],
  "metadata": {
    "colab": {
      "base_uri": "https://localhost:8080/",
      "height": 35
    },
    "id": "2rnrfMAf-AB9",
    "outputId": "c6357a8b-5163-4884-c82e-05651a65571c"
  },
  "execution_count": 38,
  "outputs": [

```

```
{
  "output_type": "execute_result",
  "data": {
    "text/plain": [
      "'sunflower'"
    ],
    "application/vnd.google.colaboratory.intrinsic+json": {
      "type": "string"
    }
  },
  "metadata": {},
  "execution_count": 38
}
]
},
{
  "cell_type": "markdown",
  "source": [
    "# **We Achieved 93 percent of accuracy with this model** \n",
    "# **Trained by Team ID : PNT2022TMID17050**"
  ],
  "metadata": {
    "id": "2f85wU8fLOSi"
  }
}
]
```