Lab Activity – 08

Year 3 – Interactive Media   **Semester 1, 2023**

Artificial Neural Network

ANN – Artificial Neural Network is like a virtual brain made of interconnected 'neurons' that can process information. It takes in data, processes it through layers of these virtual neurons, and learns to recognize the patterns or make decisions.

Artificial neural networks are used for a range of applications, including image recognition, pattern recognition and classification, speech recognition, machine translation, and medical diagnosis and etc.

Part 1

1. Data Preprocessing

   i.   Import the libraries

   ```
   import numpy as np
   import matplotlib.pyplot as plt
   import pandas as pd
   ```

   ii. Get the Dataset via Kaggle
        https://www.kaggle.com/datasets/d4rklucif3r/cat-and-dogs?resource=download

   iii. Load the Dataset
        a. Mount the Google Drive

   ```
   from google.colab import drive
   drive.mount('/content/drive')
   ```

        b. Assign the Directory

   ```
   folder_path = "/content/drive/My Drive/dataset"
   ```

2. Create subdirectories for training and testing data

   ```
   train_dir = os.path.join(data_dir, "train", category)
   test_dir = os.path.join(data_dir, "test", category)
   os.makedirs(train_dir, exist_ok=True)
   os.makedirs(test_dir, exist_ok=True)
   ```

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3. Build Artificial Neural Network
    i.   Import the Keras libraries and the packages

```
import kerasfrom keras.models
import Sequential
from keras.layers import Dense
```

    ii.   Assign the Artificial Neural Network

```
classifier = Sequential()
```

    iii. Add the Layers

    a. First Hidden Layer / Input Layer
        `layers.Flatten(input_shape=(100, 100, 1))`

    b. Second Hidden Layer
        `layers.Dense(128, activation='relu')`

    c. Layer of Reduce Overfitting
        `layers.Dropout(0.5)`

    d. Output Layer
        `layers.Dense(2, activation='softmax')`

    iv.   Train the ANN

        i. Compile the ANN

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

        ii. Training the Set

```
model.fit(X_train, y_train, epochs=5, batch_size=32, validation_split=0.2)
```

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iii. Predict the Results

```
def preprocess_image(image_path):
    img_array = cv2.imread(image_path, cv2.IMREAD_GRAYSCALE)
    img_array = cv2.resize(img_array, (100, 100))
    img_array = img_array / 255.0
    img_array = img_array.reshape(-1, 100, 100, 1)
    return img_array

image_path = "_____"
input_image = preprocess_image(image_path)
predictions = model.predict(input_image)
```

Part 2

With the knowledge gain from Part 1, Use the ANN model to train the model for Fruit Classification.
Refer the dataset: https://www.kaggle.com/datasets/utkarshsaxenadn/fruits-classification