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Subject : Software Lab 2 (ANN)

Lab Assignment Group B- 2

Problem Statement :

Write a python program to illustrate ART neural network..

Code:

```python
import tensorflow as tf
import numpy as np
X = np.array([
    [0, 1, 1],
    [1, 0, 1],
    [1, 1, 0],
    [0, 0, 1],
    [0, 1, 0],
    [1, 0, 0],
    [0, 0, 0],
    [1, 1, 1],
])
y = np.array([0, 1, 2, 0, 2, 1, 0, 2])
inputs = tf.keras.Input(shape=(3,))
prototype_layer = tf.keras.layers.Dense(3)
```

```python
comparator_layer = tf.keras.layers.Dense(3, activation='sigmoid')
prototype = prototype_layer(inputs)
comparator = comparator_layer(inputs)
match_layer = tf.keras.layers.Dot(axes=(1,1))([prototype, comparator])
match_layer = tf.keras.layers.Lambda(lambda x: x / 3.0)(match_layer)
mask_layer = tf.keras.layers.Lambda(lambda x: tf.one_hot(tf.argmax(x), 3))(match_layer)
output_layer = tf.keras.layers.Dense(3, activation='softmax')
output = output_layer(prototype * mask_layer)


model = tf.keras.Model(inputs=inputs, outputs=output)
model.compile(optimizer='adam', loss='sparse_categorical_crossentropy')
model.fit(X, y, epochs=100)
X_test = np.array([
    [1, 1, 1],
    [0, 0, 0],
    [1, 0, 1],
])
y_pred = np.argmax(model.predict(X_test), axis=1)


print(y_pred)
```

Output:

```
In [5]: X_test = np.array([
            [1, 1, 1],
            [0, 0, 0],
            [1, 0, 1],
        ])
        y_pred = np.argmax(model.predict(X_test), axis=1)
        print(y_pred)
```

```
1/1 [==============================] - 0s 14ms/step
[2 0 0]
```