# TensorFlow

TensorFlow is an open-source machine learning framework developed by Google for building and training various types of deep learning models. It provides a flexible ecosystem of tools, libraries, and community resources that facilitate the development of AI applications across different domains. With its graph-based computation model and support for diverse hardware platforms, TensorFlow has become a cornerstone in the field of artificial intelligence, empowering researchers and developers to innovate and deploy scalable machine learning solutions.

## Features of TensorFlow

- Flexibility: Supports both high-level APIs like Keras and low-level operations for customization.
- Scalability: Scales from single CPUs to distributed computing across GPUs and TPUs.
- Comprehensive Ecosystem: Includes tools like TensorFlow Extended (TFX), TensorFlow Hub, and TensorFlow Serving.
- Cross-Platform Compatibility: Runs on desktops, servers, cloud, and mobile devices.
- TensorBoard: Provides visualization for model graphs and training metrics.
- Community Support: Large community for resources, tutorials, and pre-trained models.
- Integration: Seamless integration with Python libraries like NumPy and scikit-learn.
- Production Readiness: Tools like TensorFlow Serving and TensorFlow Lite for deployment.
- Innovation: Actively developed by Google and community with continuous updates and improvements.

## Set up TensorFlow

Import TensorFlow into your program:

```
import tensorflow as tf
```

```
print("TensorFlow version:", tf.__version__)
```

# Set up Keras and tensorflow

```
import tensorflow as tf
From tensorflow import keras
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Conv2D, MaxPooling2D, Flatten, Dense, Dropout
from tensorflow.keras.datasets import cifar10
from tensorflow.keras.utils import to_categorical
```

# Use optimization function- adam

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

# Build a machine learning model

Build a tf.keras.Sequential model
```
model = tf.keras.models.Sequential([
  tf.keras.layers.Flatten(input_shape=(28, 28)),
  tf.keras.layers.Dense(128, activation='relu'),
  tf.keras.layers.Dropout(0.2),
  tf.keras.layers.Dense(10)
])
```

# Train and evaluate your model

```
model.fit(x_train, y_train, epochs=5)
model.evaluate(x_test,  y_test, verbose=2)
probability_model = tf.keras.Sequential([
  model,
  tf.keras.layers.Softmax()
])
probability_model(x_test[:5])
```

# Evaluate the model

```
loss,accuracy= model.evaluate(x_test, y_test)
print(f'accuracy:{accuarcy:.4f}')
```

# Conclusion

TensorFlow and Keras have revolutionized the field of deep learning by providing powerful tools for building and training neural networks. TensorFlow, as a robust open-source framework, offers flexibility and scalability for deploying machine learning models across different platforms and devices. Keras, built on top of TensorFlow, simplifies the process of constructing neural networks with its user-friendly, high-level API, making it accessible even to those new to deep learning. Together, they have significantly accelerated research and development in AI applications, paving the way for innovations in various fields from healthcare to autonomous systems.

**Tensorflow & Keras Model Link:**
https://drive.google.com/drive/folders/1IS_XUh5vsWDvSEl4MHLvmNdrT63T7p_O?usp=drive_link