```python
# 機械学習 Python Program
# Fashion MNIST dataset の Seqential モデルによる学習と評価並びに検証
```

```python
import tensorflow as tf
from tensorflow import keras
```

```python
# fashion_mnistの読み込み
fashion_mnist = keras.datasets.fashion_mnist
(X_train_full, y_train_full), (X_test, y_test) = fashion_mnist.load_data()
```

```python
# 検証セットの作成＆全てのデータの浮動小数点数への変換（0から1）
X_valid, X_train = X_train_full[:5000] / 255.0, X_train_full[5000:] / 255.0
y_valid, y_train = y_train_full[:5000], y_train_full[5000:]
X_test = X_test / 255.0
```

```python
class_names = ["T-shirt/top", "Trouser", "Pullover", "Dress", "Coat",
               "Sandal", "Shirt", "Sneaker", "Bag", "Ankle boot"]
```
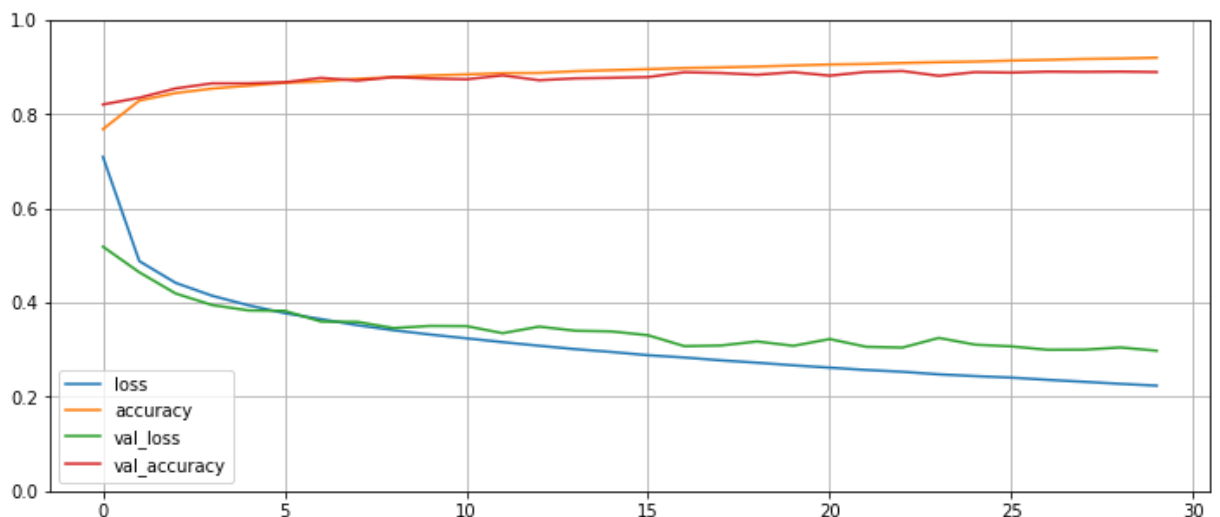
```python
# シーケンシャルAPIを使ったモデルの作成（層のリスト）
model = keras.models.Sequential([
    keras.layers.Flatten(input_shape=[28, 28]),
    keras.layers.Dense(300, activation="relu"),
    keras.layers.Dense(100, activation="relu"),
    keras.layers.Dense(10, activation="softmax")
])
```

```python
# モデルのコンパイル
model.compile(loss="sparse_categorical_crossentropy",
              optimizer="sgd", metrics=["accuracy"])
```

```python
# モデルの訓練と評価
history = model.fit(X_train, y_train, epochs =30, validation_data=(X_valid, y_valid))
```

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

```python
# グラフの描画
pd.DataFrame(history.history).plot(figsize=(12,5))
plt.grid(True)
plt.gca().set_ylim(0, 1) # 縦の範囲を0から1までに
plt.show()
```

```python
# 学習の評価
score = model.evaluate(X_test, y_test, verbose=0)
print("Test loss:", score[0])
print("Test acuuracy:", score[1])
```

In [16]:
```python
# モデルを使った予測
num =5
X_new = X_test[:num]
y_pred = model.predict_classes(X_new)
print("予測：")
np.array(class_names)[y_pred]
```

予測：

Out[16]:
```
array(['Ankle boot', 'Pullover', 'Trouser', 'Trouser', 'Shirt'],
      dtype='<U11')
```

In [17]:
```python
# 正解
y_new = y_test[:num]
print("正解：")
np.array(class_names)[y_new]
```

正解：

Out[17]:
```
array(['Ankle boot', 'Pullover', 'Trouser', 'Trouser', 'Shirt'],
      dtype='<U11')
```