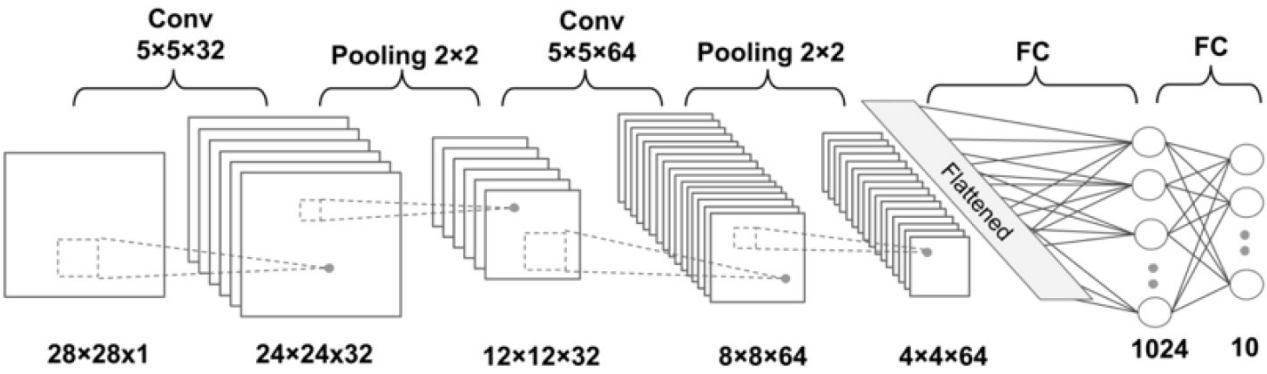
# AI & Pattern Recognition  Classwork 03  LeNet

**ID：** _____ **Name：** _____ **March 26, 2025**

1. Given a LeNet model for handwritten digit classification as the following figure.




A formula to compute the size after convolution: input vector ***x*** has size ***n*** and the filter ***w*** is of size ***m***. The size of the output resulting from ***x***, ***w*** with padding ***p*** and stride ***s*** is determined as follows:

$$o = \left\lfloor \frac{n + 2p - m}{s} \right\rfloor + 1$$

(a) Describe the type of padding in each convolutional layer and verify the result.

(b) Write a code to implement a LeNet model on the basis of the digit MNIST dataset. The dataset is separated into 75% train set and 25% test set. Train the model using the Adam optimization (define epoch number by yourself). Compute the accuracy of classification on the train set and test set, respectively.

You can use the following code to load a MNIST dataset

```
from tensorflow import keras
mnist = keras.datasets.mnist
(X_train_full, y_train_full), (X_test, y_test) = mnist.load_data()
```