# K-Nearest Neighbor Classifier
# MNIST Dataset

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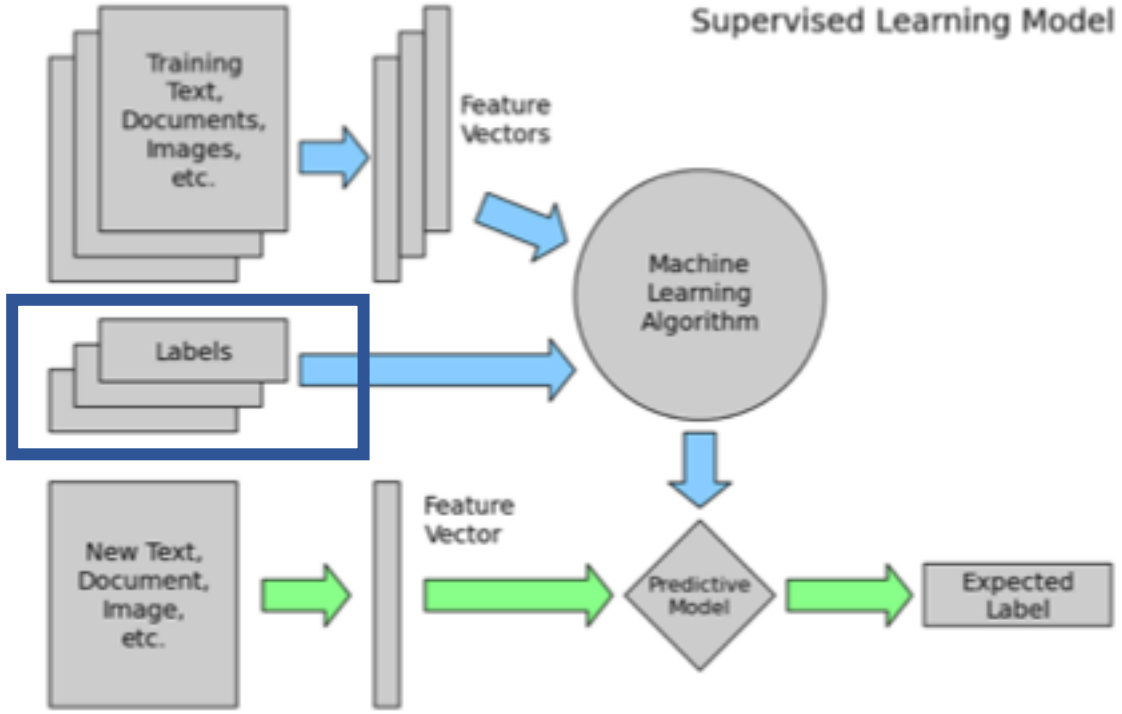
# Today

- Recap – Supervised Learning
- kNN classifier
- Scikit-learn tutorial with MNIST dataset

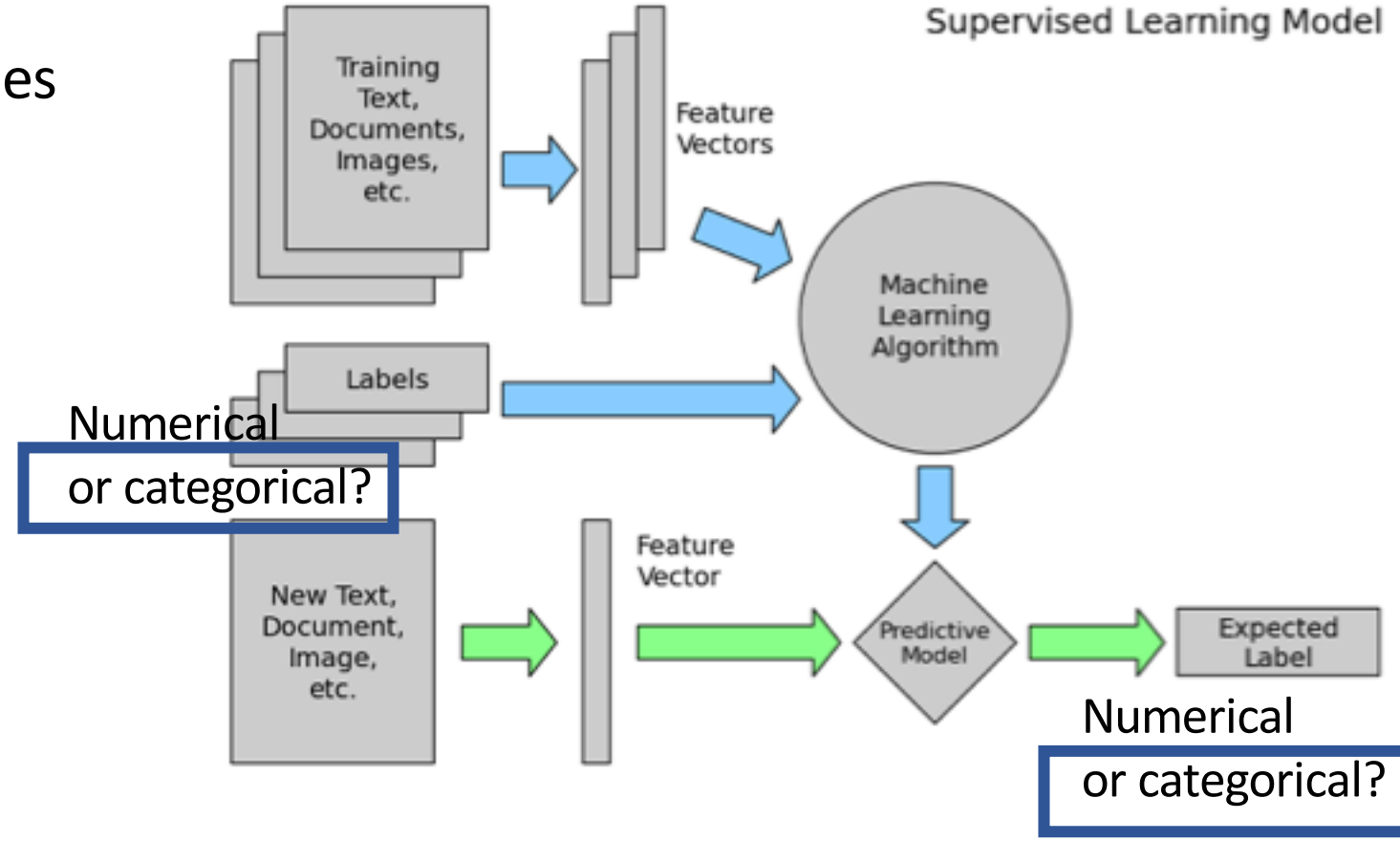
# 2 Types of ML Systems

- Supervised Learning
  - Trained **with** human supervision
  - Training set has **labels**
- Unsupervised Learning
  - Trained **without** human supervision
  - No class labels



# Common Supervised Learning Tasks

- Classification
  - Predicts class labels/categories
  - Example:
    - cancer/no cancer
    - husky/malamute/chiba/akita
    - 1/2/3/4/5/6/7/8/9/0
- Regression
  - Predicts continuous values
  - Example:
    - House pricing
    - Temperature



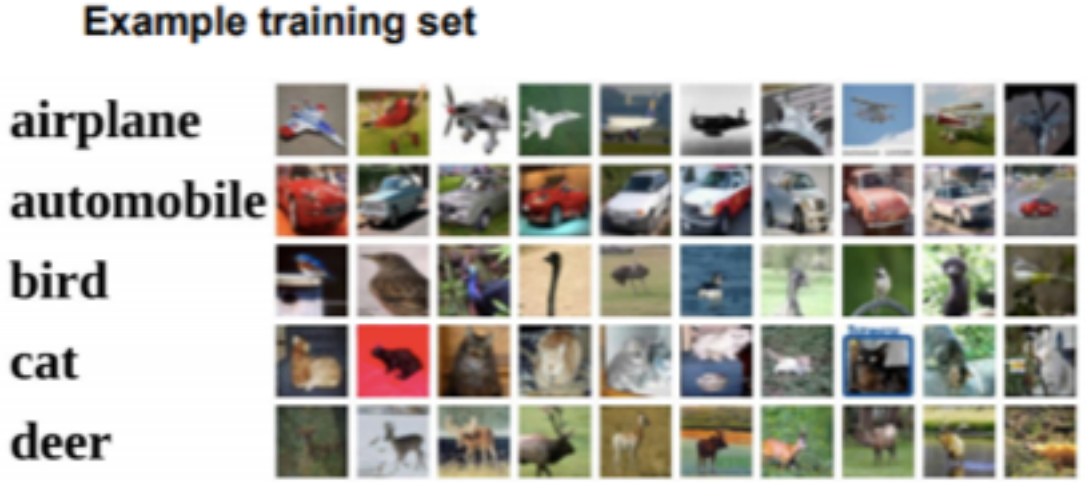
# Supervised Learning Algorithms - **Classifiers**

- k-Nearest Neighbors (kNN)
- Linear Regression
- Logistic Regression
- Support Vector Machines (SVM)
- Decision Trees
- Neural Network

# Supervised Learning

```
def train(train_images, labels):
      # ML
      return model
```

```
def predict(test_images, labels):
      # use model to predict labels
      return test_labels
```



# K-Nearest Neighbor Algorithm

```
def train(train_images, labels):
      # ML
      return model
```

จดจำทุก training data และ training label

```
def predict(test_images, labels):
      # use model to predict labels
      return test_labels
```

หา train_image ที่ใกล้เคียงกับ test_image มากที่สุด แล้วทำนายว่าเป็น label ของ train_image นั้น

# Example Dataset: MNIST

- Handwritten digits (”Hello World” of Machine Learning)
- 10 classes: 0, 1, 2, …, 9

# More on kNN…

- Refer to Stanford's CS231n slides
  - http://cs231n.stanford.edu/slides/2018/cs231n_2018_lecture02.pdf
- Visualize kNN classifier's boundary
  - http://wittawat.com/posts/knn_boundary.html
  - http://vision.stanford.edu/teaching/cs231n-demos/knn/

# Scikit-learn Tutorial

- Create lab2.ipynb
- Follow instructions

# Next week

- Manually implementing kNN
- Linear Classification