

# Validation

- Split into training and test set
- k-fold cross validation
- leave-one-out cross validation

# Split into training and test set

- Randomly split data set into a training set and a test set.  
Usually 80% or 90% of data used for training, remaining data for testing
- Stratified split – Same as above, but ensure that the proportion of classes are the same in the training and test set

# k-fold Cross Validation

- Randomly split data set into a k groups (or folds) of equal size  
For `i` in range(`k`) :  
    Use groups `0, ..., i-1, i+1, ..., k-1` for training  
    Use group `i` for testing  
Compute performance metrics for all test cases
- Stratified split – Same as above, but ensure that the proportion of classes are the same in each of the groups

# Leave-one-out cross validation

- Same as k-fold cross validation with  $k = \text{size of the data set}$

For  $i$  in range(data set size):

    Use examples  $0, \dots, i-1, i+1, \dots, k-1$  for training

    Use examples  $i$  for testing

Compute performance metrics for all test cases

- Stratified split – Same as above, but ensure that the proportion of classes are the same in each of the groups

# Exercise

Evaluate algorithm 2 to classify the MNIS dataset using:

- Leave-one-out cross validation
- 5-fold cross validation