

# Homework 5 solution template

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Here is a template that your solutions should roughly follow. Include outputs as figures, and code should be included in the end.

## 1 Decision trees

1. Empty decision tree.

- accuracy on training set: \_\_\_\_\_
- accuracy on test set: \_\_\_\_\_
- explain your answer:

2. Decision tree of depth 1

- (a) The coordinate of pixel with the highest accuracy:  $(x, y) =$ \_\_\_\_\_. Figure 1 visualizes the scores.

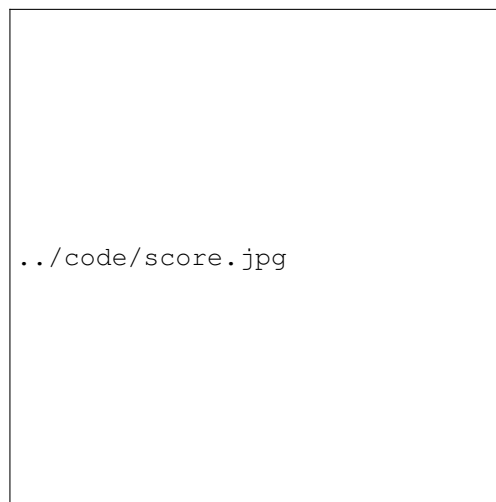


Figure 1: Visualizing scores

(b) Write down the decision tree that obtains the best classification

(c) Accuracy of decision tree with depth 1 on test set: \_\_\_\_\_

3. Decision tree of depth 2.

(a) Write down the decision tree in if-then-else statement

(b) Accuracy of decision tree with depth 2 on test set: \_\_\_\_\_

## 2 Linear classifier

- Accuracy of linear classifier on test set: \_\_\_\_\_
- Figure 2 visualizes positive and negative parts of weights.

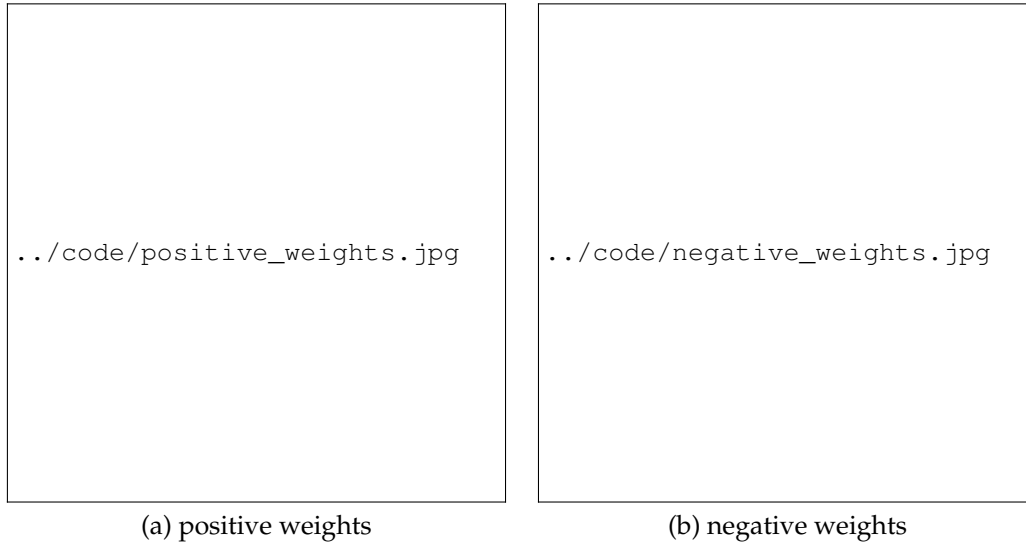


Figure 2: Visualizing weights

## 3 Nearest neighbor classifier

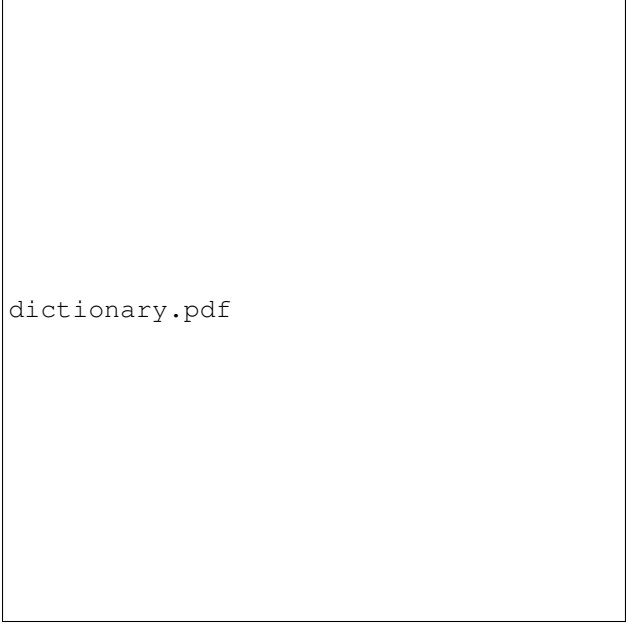
Figure 3 plots the test accuracy against the number of  $k$  for k nearest-neighbor classifier



Figure 3: Accuracy of k-nearest-neighbor classifier

## 4 Bag-of-visual-words representations

1. Visualize the dictionary



dictionary.pdf

2. **Extra credit:** test accuracy: \_\_\_\_\_

## 5 Solution code

Include the source code for your solutions as seen below (only the files you implemented are necessary). In latex the command `verbatiminput{alignChannels.m}` allows you to include the code verbatim as seen below. Regardless of how you do this the main requirement is that the included code is readable (use proper formatting, variable names, etc.) A screenshot of your code works to provided you include a link to source files.

**5.a scoreFeatures.m**

**5.b code training a decision tree**

**5.c code evaluate a decision tree on test set**

**5.d code for training and evaluating the linear model**

**5.e code for k-nearest neighbor classification**

**5.f constructDictionary.m**

**5.g encodeImage.m**