

Machine Learning - Homework 1

Spring 2018

Exercise 1 (3 pts)

Read the open article about the dangers of autonomous weapons <https://futureoflife.org/open-letter-autonomous-weapons/> and give a short recap of these dangers. Furthermore, find another example of dangers with machine learning/artificial intelligence and explain this in your own words.

Exercise 2 (3 pts)

Recall or read the definitions of *linear equation in two variables* and *quadratic function* (on Wikipedia or a basic math book). Note that in a linear equation in two variables we can replace the second variable y by $f(x)$ to get a function in only one variable x . We call this a *function given by a linear equation*.

Decide for each of the following equations, if they are a function given by a linear equation, a quadratic function or none of the two:

1. $f(x) = x^2 + 5$
2. $f(x) = \frac{3}{2}x - \frac{5}{7}$
3. $f(x) = \sqrt{x}$
4. $f(x) = \sqrt{2}x^2 + 5x - 2$
5. $f(x) = 2^x$
6. $f(x) = -x$

Exercise 3 (2 pts)

1. Assume you want to use machine learning to predict the stock market index in dependence of the unemployment rate. What are the attribute and the target variable?
2. Assume you want to use machine learning for facial recognition by eye color, nose length and face length. What are the attributes and the target variable?

Exercise 4 (2 pts)

Assume we have the following imaginary (and very small) data set for iris flowers:

sample no	petal length (in cm)	sepal length (in cm)	iris type
1	3	1	setosa
2	2	1	versicolor
3	2	2	versicolor

Find weights w_0, w_1, w_2 such that the Perceptron prediction rule, as explained in class, works correctly for this data set.

(Note that there are many possible solutions.)