Artificial Intelligence II
Assignment 1 Report

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Exercise 2

This exercise is pretty straightforward. I implemented manually the different gradient descent algorithms. Also, I implelented manually a Grid Search class in order to tune the hyper-parameters. I have added plenty of comments and text in the notebook, to make clear every step I choose to take, and the reason for taking this step. If there is one thing that could be added, it's an explanation of why the model is not underfitting/overfitting. I will do that very briefly here:

- **Why the model is not underfitting**

  We can take a look at the learning curves inside the Notebook to gain insight. If the model was underfitting, then

  1. The training loss would be converging (increasingly) to a non-minimum value.
  2. The validation loss would be very close to the training loss.

  The second bullet matches our graphs, but the first one doesn't.

  The main reasons why a model would underfit are:

  - There are not enough features, that is, the model is too simple.
  - The regularization parameter λ is set too high.

  None of those cases apply to our occasion.

- **Why the model is not overrfitting**

  Again by taking a look at the learning curves inside the Notebook, we can deduce that the model is not overfitting, because if it was, then

  1. The model would not be able to generalize, that is, there would be a notable gap between training loss and the validaiton loss.

  This is not our case, as we can clearly see that in the graphs.

  The main reasons why a model would overfit are:

- There are too many features, that is, the model is too complicated.
- The regularization parameter λ is set too low.
- There are not enough training examples $x^{(i)}$.
- There is no diversity in the training set.

None of those cases apply to our occasion.

Exercise 3