

Machine Learning From Disaster

Calculating the Survival Rate for Passengers in the Titanic

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I. INTRODUCTION AND RESEARCH PROBLEM

All details for this project will be provided by a competition titled "Titanic - Machine Learning from Disaster" introduced by kaggle.com [1].

This following section will provide a brief background and a statement of the problem this project is addressing.

A. Introduction

This project will build a predictive model that aims to find the type of people who are going to survive the sinking of the Titanic, a well renowned ship that was believed to be "unsinkable" until it hit an iceberg in 1912, resulting in the death of 1502 passengers/crew.

This project will utilize passenger information, such as name, age, gender, socio-economic class, etc., to determine what sorts of groups were more likely to survive than others during the sinking of the Titanic.

This data aforementioned above will be provided by the Kaggle competition and the goal of this project is to engineer code that uses the data to calculate the survival rate of various groups of people.

B. Research Problem

This project will be creating a predictive model that will dictate the type of individuals that were the most likely to survive the sinking of the Titanic.

To give more detail, this project will be provided with a lot of testing data in order to make predictions on who will survive. In consequence of this data, this team will be able to create a predictive machine learning model that utilizes the data provided for this project to make predictions using various models previously covered in this course. The specific details regarding any related work that relates to this project will be discussed in depth in later sections.

To get more into specifics, this project will utilize these following .csv files to find a solution for this problem: test.csv and train.csv.

For the train.csv file, it will contain information on who survived the sinking of the Titanic in order to train the model that was developed.

For the test.csv file, it is used to see how well the model that was developed performs on unseen data. This file will be

used to make predictions on who survived based on the model that was trained using train.csv.

II. RELATED WORK

To create a solution for this project, our code needed to apply the concepts that were learned about logistic regression. To aid with this endeavor, our team utilized the problems that involved logistic regression in Assignment 1.

In this assignment, there was a task that involved training a logistic regression model that classifies two categories of sign language images. Furthermore, through this assignment, we used the forward and backward computation implementation as a reference on implementing a logistic regression model in our own code.

More specifically, our team utilized the equations present in these computations in Assignment 1 and applied them in our code to produce a solution to the Titanic problem. In the forward pass, our team utilized these equations for the activation and the cost: $A = \sigma(w^T X + b)$ and $Cost = -\frac{1}{m} \sum_i y^{(i)} \log(a^{(i)}) + (1 - y^{(i)}) \log(1 - a^{(i)})$. In addition, for the backward pass computations, our team utilized these following equations from Assignment 1:

- 1) $dZ = A - Y$
- 2) $dw = \frac{1}{m} X dZ^T$
- 3) $db = \frac{1}{m} np.sum(dZ)$

These equations were used to compute the gradients dw and db as well as the cost. Afterwards, our code then utilized these gradients and returned them in the code, much like the code in Assignment 1.

Furthermore, another necessary part of our code was the sigmoid function, which we used to implement our logistic regression model. What our team used to implement the sigmoid function was the example of a sigmoid function shown in Assignment 1.

In this part of the assignment, my team utilized the equation for the sigmoid function, which was $\sigma(z) = \frac{1}{1+e^{-z}}$, in order to implement our own sigmoid function to solve our Titanic problem. Additionally, our team also used the code present for the sigmoid function in Assignment 1 as a reference when implementing our own version of the sigmoid function.

In addition to the sigmoid function, our team also needed to create/implement a function for the gradient descent. In