

# Machine Learning Final Project Report

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## **Introduction:**

For the final project I implemented a classification algorithm. The project essentially classifies food images, whether an image is a hot-dog or not. For this project I implemented logistic regression, KNN and principle component analysis.

## **Dataset:**

The dataset was taken from Kaggle, the name of the dataset is Seefood. The dataset consisted of Training Data and Testing Data. Within both the directory was a subdirectory named hot\_dog and not\_hot\_dog. The training data set consisted of 498 images, half were hot-dog image and other was random food images. The testing data had 480 images half were hot-dog images and other half was random food images.

## **Extracting Data:**

For extracting data, I made use of the OpenCV library cv2 using this library I extracted data from image and stored the data in a list. The list essentially is the pixel value of each pixel in the image. For easier calculations I converted the image into greyscale, this was to make the calculations easy. The data would be very complex if RGB values were used because each pixel would have required 3 values R,G and B each. Which would have made the algorithm very

complex. After extracting the data we got an nested array each array represented the image pixel values. Since the data images were not of the same size the resolution of the images were changed to 50X50 pixels the resolution can also be changed the code.

### **Applying Algorithms:**

I made use of PCA to reduce the dimensionality of the data I used 3 components to represent the data. I tried the implementation with more components but the eventually gave me the similar results so the image data was reduced to 3 components for each image.

I made use of Logistic Regression to classify the data. I made use of the gradient descent method for the data to converge. The equation was of three variables and the degree was 1.

The logistic regression algorithm was tested with data set to check its accuracy and the accuracy came more than 90% for each data set. The data set which was prepared after applying PCA was inputted in the logistic regression classifier to get the output.

I also applied the KNN to compare the results the accuracy increased but not drastically after applying the algorithm also I increased the number of components to 50 while applying KNN

### **Accuracy:**

The accuracy of the classifier was around 71%. I made changes to the iterations and the learning rate but each time the accuracy came around 67-72 percent range. Maybe use of additional dataset could help with the accuracy. Also the feature extractions can be improved to represent thee data more correctly, Since the image classified are of food a large number of dataset would definitely help our cause.

**Python version. 3.6.4**

**Libraries used.**

NumPy

OpenCV

Matplotlib

Scikit-learn

The Logistic Regression and KNN were implemented from scratch

**Dataset link.**

<https://www.kaggle.com/dansbecker/hot-dog-not-hot-dog/data>

**Acknowledgements/Citations.**

[https://scikit-learn.org/stable/auto\\_examples/decomposition/plot\\_pca\\_iris.html](https://scikit-learn.org/stable/auto_examples/decomposition/plot_pca_iris.html)

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