# 10-601b: Mid-term report

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## Abstract

In this report, we list the results we've achieved for classifying the subset of the CIFAR-10 dataset. We use the K-nearest neighbours and SVM to achieve an accuracy of X% and Y% respectively.

## 1 Introduction

- The problem statement
- The Cifar-10 dataset
- Our approaches

## 2 Exploratory data analysis

- How we intend to test our results
- Distribution of the various labels
- Color variance of the dataset
- Average image of each label class
- Average HOG in each label class

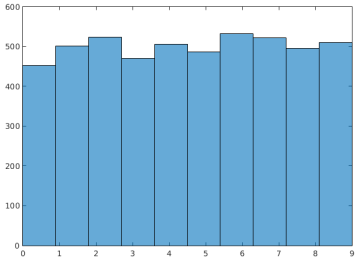


Figure 1: Distribution of the ground truth labels

## 3 Classification with K-means and K-Nearest Neighbours

The very first approach we tried was using the simple k-means and k-nearest neighbours approaches. These are simple to implement and help understand the dataset provided to use better. Details of problems with these techniques are provided in detail below.

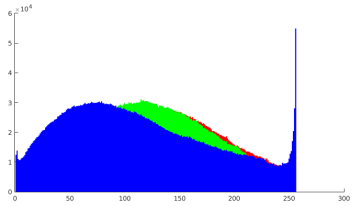

Figure 2: Distribution of RGB across all 5000 images

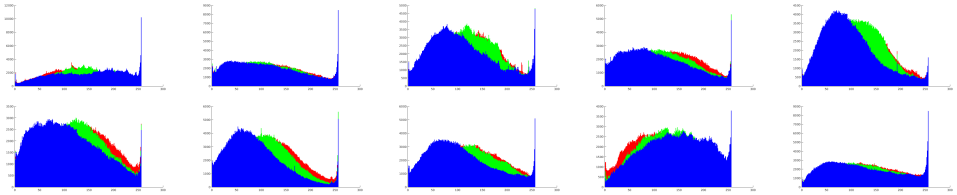

Figure 3: RGB histogram for each class

### 3.1 K-Means

The K-means clustering algorithm was the first technique we tried. The first attempt was to use the raw image data and find clusters in the pixel RGB values. This approach took a long to train but

With the

Training time for K-Means.

- K-means on raw images
- K-means on filtered images (filter banks, gabor filters)
- K-means speed as the number of clusters increase

### 3.2 K-Nearest Neighbours

- Given the terrible training speed
- Using filtered images
- Classification speed
- Switching to HOG classifiers

### 3.3 Results

## 4 Support vector machines

- The outline goes here?
- More outline here

### 4.1 Results

## 5 Future work

Write something from the abstract of the paper`http://homes.cs.washington.edu/~pedrod/papers/nips12.pdf` we worked on.

Table 1: Results with K-means clustering and K-nearest neighbours

| Technique | Training time | Accuracy |
|---|---|---|
| Dendrite | Input terminal | 5% |
| Axon | Output terminal | 6% |
| Soma | Cell body (contains cell nucleus) | 7% |

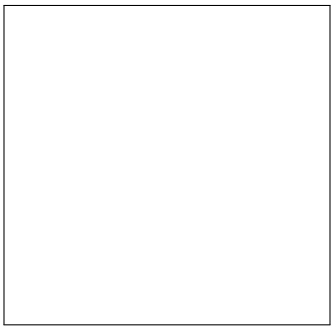

Figure 4: Sample figure caption.

### Acknowledgments

Use unnumbered third level headings for the acknowledgments. All acknowledgments go at the end of the paper. Do not include acknowledgments in the anonymized submission, only in the final paper.

### References

References follow the acknowledgments. Use unnumbered third level heading for the references. Any choice of citation style is acceptable as long as you are consistent. It is permissible to reduce the font size to 'small' (9-point) when listing the references. **Remember that this year you can use a ninth page as long as it contains *only* cited references.**

[1] Alexander, J.A. & Mozer, M.C. (1995) Template-based algorithms for connectionist rule extraction. In G. Tesauro, D. S. Touretzky and T.K. Leen (eds.), *Advances in Neural Information Processing Systems 7*, pp. 609-616. Cambridge, MA: MIT Press.

[2] Bower, J.M. & Beeman, D. (1995) *The Book of GENESIS: Exploring Realistic Neural Models with the GEneral NEural SImulation System.* New York: TELOS/Springer-Verlag.

[3] Hasselmo, M.E., Schnell, E. & Barkai, E. (1995) Dynamics of learning and recall at excitatory recurrent synapses and cholinergic modulation in rat hippocampal region CA3. *Journal of Neuroscience* **15**(7):5249-5262.

Table 2: Sample table title

| PART | DESCRIPTION |
|---|---|
| Dendrite | Input terminal |
| Axon | Output terminal |
| Soma | Cell body (contains cell nucleus) |