Table 3: SVM results with tag classification

| Model | Train | Val | Test |
|---|---|---|---|
| SVM | 0.525 | 0.47 | 0.475 |
| SVM + HOG + HSV | 0.426 | 0.458 | 0.428 |

Table 4: SVM results with time bucket classification

| Model | Train | Val | Test |
|---|---|---|---|
| SVM | 0.517 | 0.455 | 0.453 |
| SVM + HOG + HSV | 0.371 | 0.383 | 0.343 |

rates ranging from 1-e2 to 1-e4. For all of the models, we used the same training, validation, and test sets, where the sizes are 5948, 400, and 400, respectively. The sets were obtained by randomly shuffling the dataset and partitioning.

## 5.1. SVM

The vanilla SVM had a test and validation accuracies of about 47 percent for tag classification task, and about two percent lower for bucket classification as shown in Table 3 and Table 4 respectively. The SVM+HOG+HSV performed significantly lower, which suggests that isolating texture and color is not beneficial for the time inference tasks. Figure 4 is the loss function for SVM applied to tag classification task. It converges after ∼250 iterations.
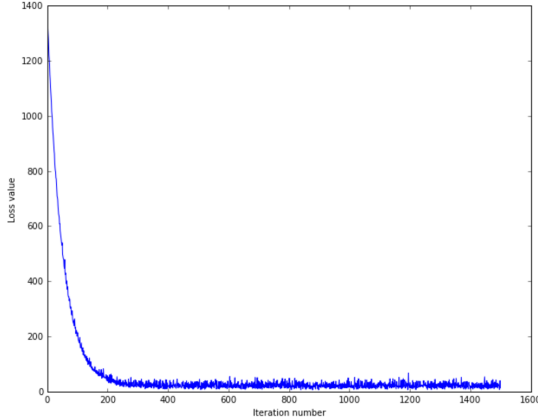


Figure 4: SVM loss for tag classification

Figure 5 is the confusion matrix for the multiclass SVM applied to tag classification problem. The horizontal axis represents the predicted labels, and the vertical axis represents the actual labels. The color of the square indicates the number of examples that have the vertical label that were classified as the horizontal label. In this instance, the SVM confused evening for night in 90/400 examples, and confused night for evening and afternoon. It did the best for the night label, mediocre for evening, and subpar for morning
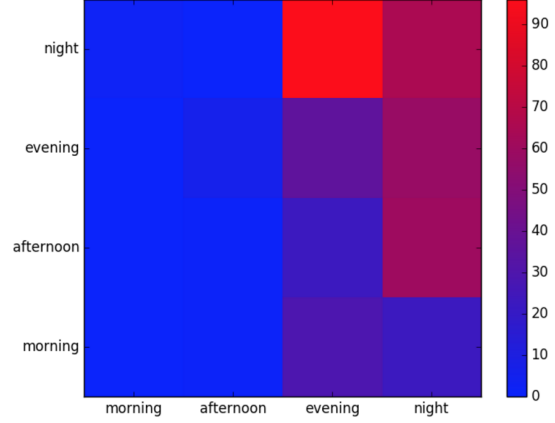


Figure 5: Confusion matrix for SVM applied to tag classification

Table 5: SVM on adaptive histogram equalized dataset

| | Train | Val | Test |
|---|---|---|---|
| SVM | 0.504 | 0.495 | 0.5125 |

Table 6: Results of 3-Layer ConvNet

| | Train | Val | Test |
|---|---|---|---|
| Tag Classification | 0.44 | 0.41 | 0.4 |
| Time Bucket Classification | 0.46 | 0.43 | 0.41 |

Table 7: Results of 3-Layer ConvNet on adaptive histogram equalized dataset

| | Val | Test |
|---|---|---|
| Tag Classification | 0.45 | 0.455 |
| Time Bucket Classification | 0.4175 | 0.415 |

and afternoon. The vanilla SVM performed best with the adaptive histogram equalized dataset, with a validation and test accuracy of about 50 percent as shown in Table 5. This was the second-best accuracy achieved from all the models.

## 5.2. 3-Layer ConvNet

We trained the 3-layer ConvNet for 10,000 iterations with a mini-batch size of 20. The ConvNet performed better on the Adaptive Histogram Equalized dataset than the normal one. In particular, test accuracy increased by 5.5% for tags. Table 6 shows the results of 3 layer on both tag classification and bucket classification problem. Results of the 3-layer ConvNet are shown in Table 7.