04/22/19 Weekly Report
Hunter Kippen

1 What I worked on last week

- I attempted to optimize the SVM classifier. I first looked at the effect of selectively adding different AR models to the feature set supplied to the SVM. The ROC curves are found in Fig. 1

- After this, I attempted to use the Radial Basis Function Kernel instead of a linear kernel. The rbf kernel did not work the greatest out of the box, so I followed Owen's advice and swept through different values for C and γ. Figures 2, and 3 show the accuracy as a surface plot versus C and γ.

  An interesting thing to note is that the optimal value is when γ is very small. I'm not sure this is what we want to use. As shown in Fig. 4, a linear kernel may still be best. I believe this warrants further exploration, but I'm not necessarily sure how to go about it.
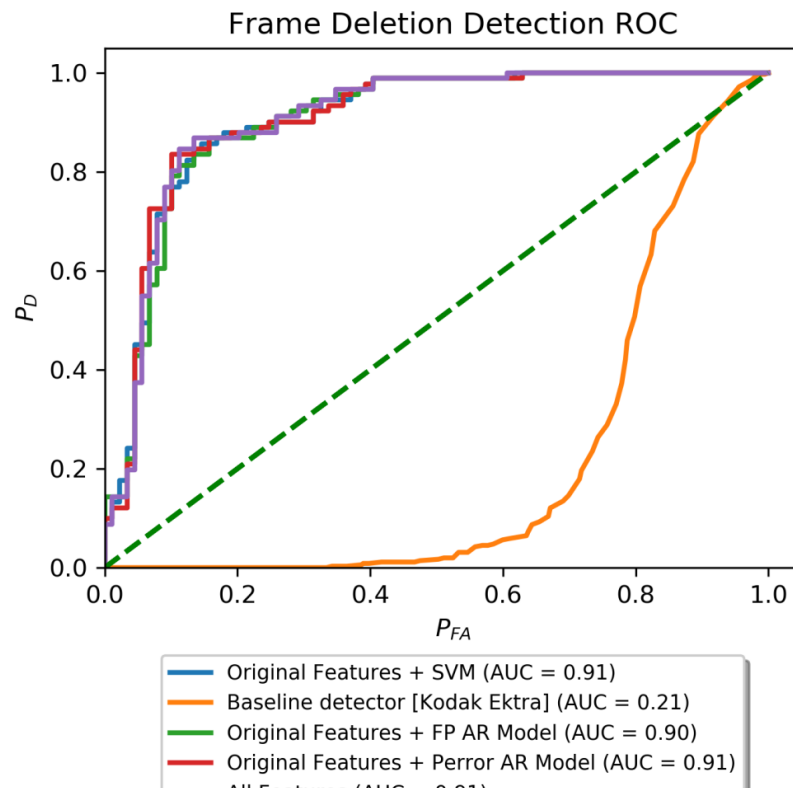

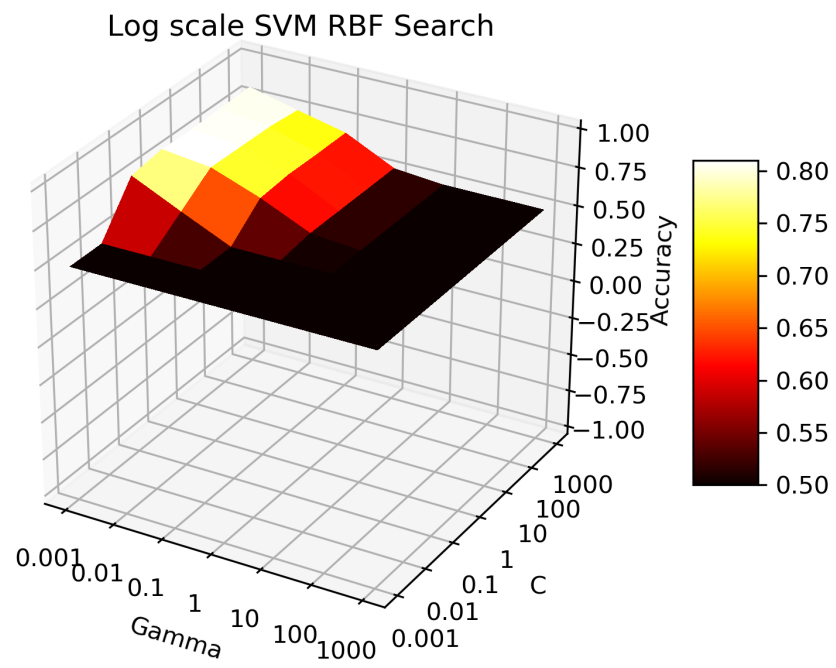Figure 1: Graph of SVM ROC Curves for SVMs Using Various Combinations of Features

Figure 2: Log Scale Search for Optimal C and γ
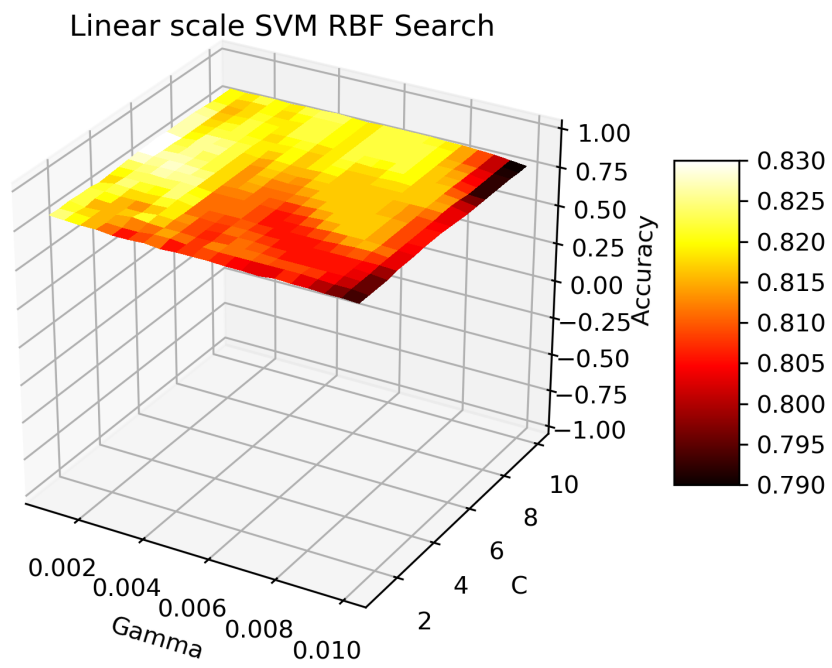
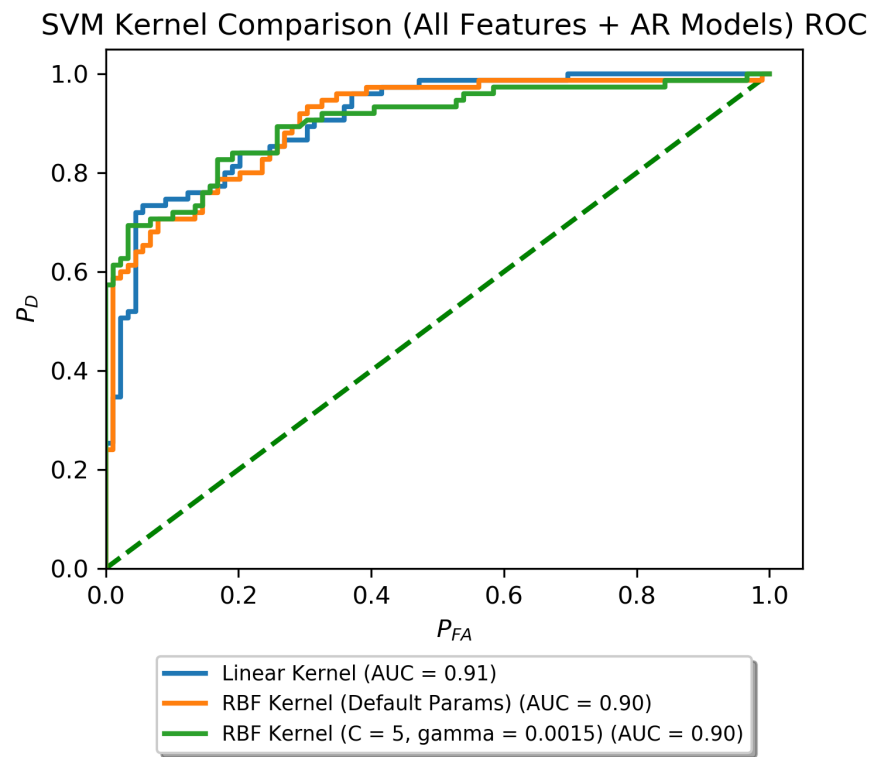Figure 3: Linear Scale Search for Optimal C and γ

Figure 4: Different SVM Kernel Parameter Comparison

2 Problems I encountered

- Regardless of relative performance, I do not believe we are quite there on overall accuracy for the detector. The paper by Barni where they explore the inconsistencies in the number of skip blocks gets over 90% accuracy for detecting both deletion and insertion, and it's localized!. At this point, I am not sure how we can match or exceed that.

3 What I plan to do this week

- I plan to explore how the current detector fairs on a combined dataset of multiple camera models. I believe it is imperative that we nail down how different initial conditions affect the detector. If the detector can generalize for say 5 different camera models, then I believe we have good features. Otherwise, some tweaks in methodology or algorithms may be necessary.

- Once we determine that, I am going to update my C code to account for B-frames, and perform similar experiments on datasets where the cameras have varied GOP structure.