Princess Tara Zamani
Adv Opt for Machine Learning
Homework 8

Video Surveillance

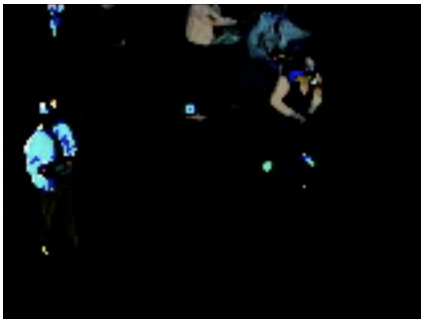
The objective of this assignment was to extract the moving object in a surveillance video by using the robust PCA machine learning model, which is written as the following optimization problem.

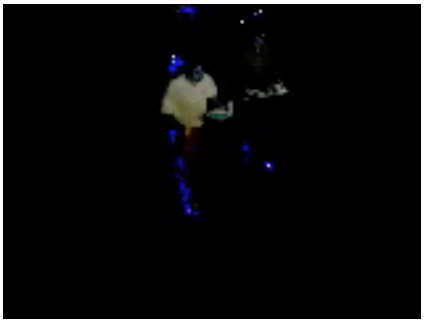
$$min_{L,\,S \in R^{mxn}} \|L\|_* + \lambda\|S\|_1, \quad s.t. \;\; L + S = M.$$

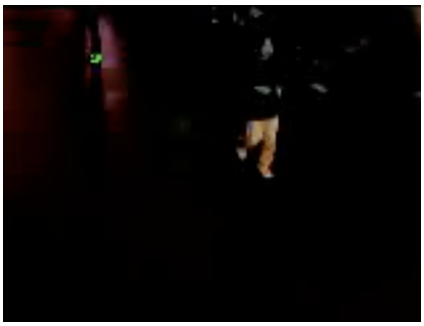
M is the original video data (contains static background + moving objects), L is the static background and S corresponds to the extracted moving objects. The ADMM algorithm was implemented with a $\lambda = \frac{1}{\sqrt{19200}}$ and a step size of ρ = 1e-4. The image data was split into three colored subsets (MR, MG, and MB). The L and S variables were obtained for each colored subset and recombined to form the final videos. Only 611 of the 3055 images were used in the implementation to reduce run-time costs.

The images below show the final L and S results.

S Results: Moving Object Video







L Results: Background Video