PROJECT PROPOSAL FOR CS754 PROJECT

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Video Denoising from Gaussian and impulse noise using Low-Rank Matrix Completion

We will be implementing the paper: Robust video denoising using Low rank matrix completion
Link: `https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=5539849&tag=1`
It describes the algorithm to denoise video having Gaussian and impulsive noises.
The algorithm works in two steps,

1. First is the patch matching algorithm which collects all the patches similar to some particular patch. When the video data is seriously corrupted by image noise, directly applying patch matching algorithms on noisy data is not suitable as the results can be very unreliable. In particular, the performance of patch matching will seriously degrade in the presence of serious impulsive noise. So a median filtering preprocessing step will be required to be applied before the patch-matching step. This will be the filter as described in paper: "Adaptive Median Filters: New Algorithms and Results"

   Link: `https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=370679`

   Next will be the patch matching algorithm. This we will implement using three-step hierarchical search algorithm described in paper: "New Fast Algorithms for the Estimation of Block Motion Vectors"

   Link: `https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=212720`

2. Second step is the algorithm for the constrained minimization problem as mentioned in the image denoising paper. This is done using the fixed point iteration algorithm, also described in the same paper.

Data set for testing the algorithm will be videos from the site `https://media.xiph.org/video/derf/`. In this we will include all the videos that had been used for testing in the paper for comparisions, and also some other videos from the same site.