mainly considered. As reference for the matching quality, four stereo image sets from the Middlebury benchmark datasets are used. These are the Tsukuba, Venus, Teddy and Cones datasets. As evaluation criterion for the matching quality, we use the average error rate which is average percent of bad pixels of all four benchmark datasets.

First, we evaluate the influence of using gray-scale intensity instead of original CIELab color representation. As mentioned above, the original adaptive support weight algorithm came from the idea of bilateral filters. The choice of CIELab color space in bilateral filters mainly because it strongly correlate with human color discrimination and has perceptually meaningful measure of color similarity [40]. Thus, in a sense, it is an open issue if the CIELab color space still has such benefits in stereo matching. Therefore, we evaluate two color spaces which are CIELab, YUV as well as gray-scale. Fig 3 shows the average error rate of matching results using different photometric information. It is observed that the accuracy difference between using CIELab and YUV color space is insignificant. On the other hand, the gray-scale color reflects a lower accuracy as missing color information in photometric cue. Although using color space seems to be more accurate, the input of gray-scale images makes our system be suitable for standard HDR, infrared cameras and most existing stereo cameras.

![Figure 3: The disparity error rate of using different color spaces.](image)

Next, the influence of the separable aggregation strategy is evaluated in the same way. Original cost aggregation strategy is computationally expensive because the adaptive kernel has to be recomputed at every pixel. The separable implementation greatly reduces the redundant and only needs a fraction of computation. Effectiveness of this simplification was verified in bilateral filter [41] as it is not only fast but it also approximates the true bilateral filter reasonably well. Fig 4, comparing the accuracy curves of different aggregation strategies, shows that separable aggregation closely follows the original implementation in most cases. This is mainly due to the fact that the separable aggregation operates along the sampling axes, so the proposed method approximates the original aggregation strategy well for image patches whose dominant orientation aligns with the sampling grid.

Lastly, we evaluate the proposed scale-and-truncate method. Fig 5 shows the matching accuracy for varying number of the quantization level. It is observed that the accuracy improves with the number of the quantization level, but improvement gets very marginal after the quantization level