

of the synthetic stereo scene from a single camera perspective, along with the ground truth disparity, occlusion map, and discontinuity map.

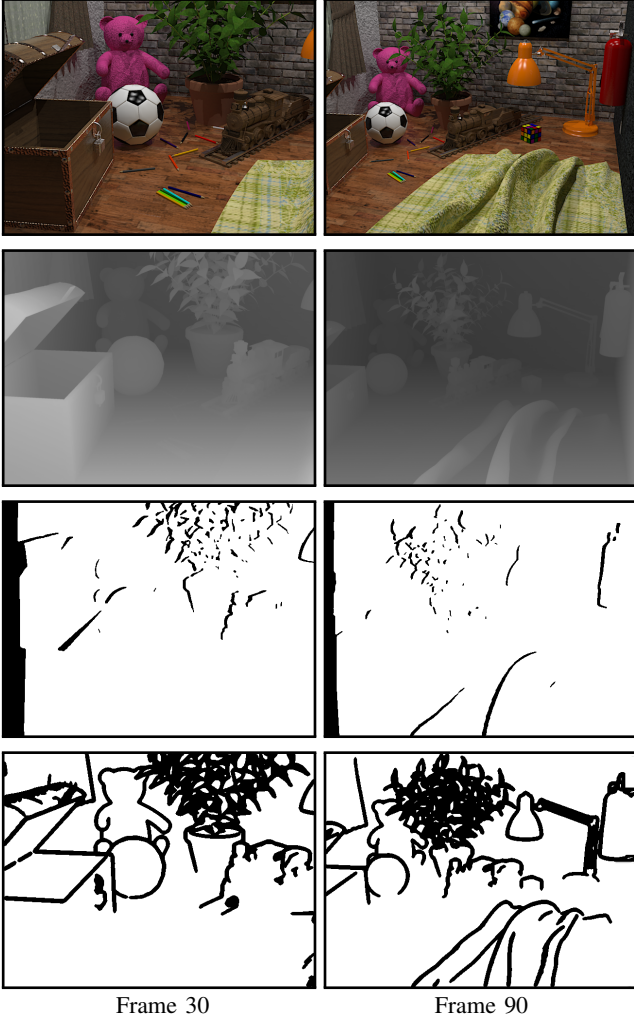


Figure 2: Two sample frames from the synthetic video sequence (1<sup>st</sup> row), along with their corresponding ground truth disparity (2<sup>nd</sup> row), occlusion map (3<sup>rd</sup> row), and discontinuity map (4<sup>th</sup> row).

The results of temporal stereo matching are given in Figure 3 for uniform additive noise confined to the ranges of  $\pm 0$ ,  $\pm 20$ , and  $\pm 40$ . Each performance plot is given as a function of the feedback coefficient  $\lambda$ . As with the majority of temporal stereo matching methods, improvements are negligible when no noise is added to the images [10], [19]. This is largely due to the fact that the video used to evaluate these methods is computer generated with very little noise to start with, thus the noise suppression achieved with temporal stereo matching shows little to no improvement over methods that operate on pairs of images.

Significant improvements in accuracy can be seen in Figure 3 when the noise has ranges of  $\pm 20$ , and  $\pm 40$ . In this scenario, the effect of noise in the current frame is reduced by increasing the feedback coefficient  $\lambda$ . This increasing of  $\lambda$  has the effect

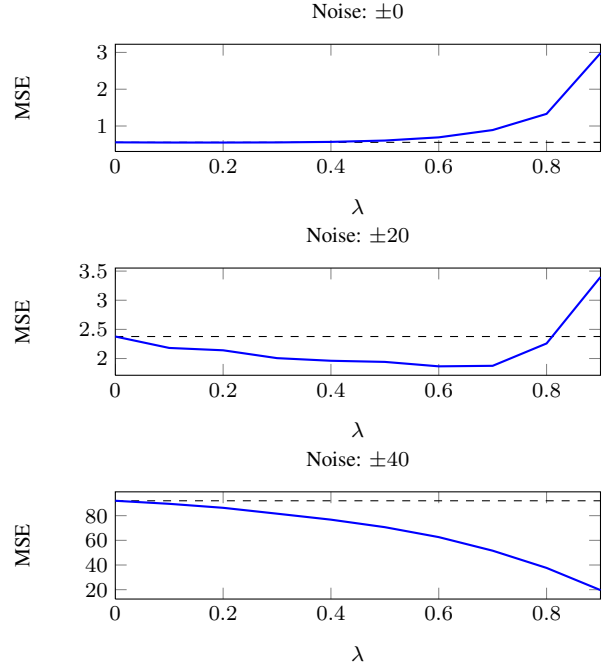


Figure 3: Performance of temporal matching at different levels of uniformly distributed image noise  $\{\pm 0, \pm 20, \pm 40\}$ . Mean squared error (MSE) of disparities is plotted versus the values of the feedback coefficient  $\lambda$ . Dashed lines correspond to the values of MSE obtained without temporal aggregation.

Table I: Parameters used in the evaluation of real-time temporal stereo matching.

Symbol	Description	Value
$\omega$	Window size for cost aggregation	33
$\tau$	Color difference truncation value	40
$\gamma_c$	Strength of grouping by color similarity <sup>1</sup>	0.03
$\gamma_g$	Strength of grouping by proximity <sup>1</sup>	0.03
$\lambda$	Temporal feedback coefficient	varied
$\gamma_t$	Strength of temporal grouping	0.01
$k$	Number of iterations in refinement stage	3
$\alpha$	Disparity difference penalty	0.08

<sup>1</sup> To enable propagation of disparity information in the iterative refinement stage, the values of  $\gamma_c$  and  $\gamma_g$  were set to 0.09 and 0.01, respectively.

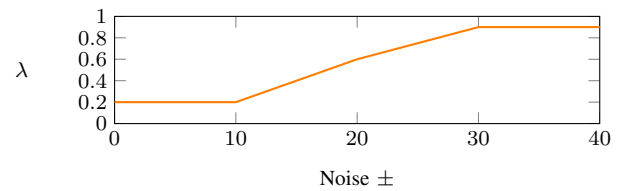


Figure 4: Optimal values of the feedback coefficient  $\lambda$  corresponding to the smallest mean squared error (MSE) of the disparity estimates for a range of noise strengths.

of averaging out noise in the per-pixel costs by selecting matches based more heavily upon the auxiliary cost, which is essentially a much more stable running average of the cost