Quantification of uncertainty is crucial for safety-critical domains. Previous approach for aleatoric uncertainty cannot separate the loss due to the target task and the one from uncertainty estimation [1]. Thus, we cannot adjust the weighting between two losses.

We propose a new optimization framework which makes (i) two losses separable, and (ii) lets one balance two losses by adjusting a weighting parameter.

We observed performance improvement on both depth estimation and uncertainty estimation on NYU Depth Dataset V2.

Our separable formulation allows us to tune the weighting between two losses.

Formulate the estimation of aleatoric uncertainty as a multi-task learning problem.

Experimental Settings

Dataset: NYU Depth Dataset V2 / Network: Based on Sparse-to-Dense [2].

Depth Metrics: RMSE, REL, MAE, δ

Uncertainty Metrics: spearman’s correlation coefficient (CC) btw errors and uncertainty values, area under the curve (AUC) of sparficification plot, RMSEₚ₃₀

References