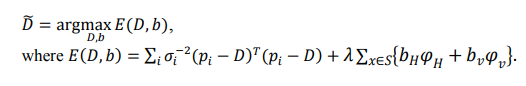
**Link:** https://ieeexplore.ieee.org/abstract/document/6898864

**Model Used:** Probabilistic fusion model.

**Method Used:** multiscale depth fusion.

**Summary:**

*Multiscale depth fusion:*



The algorithm utilizes an edge-preserving regularization technique to compute a regularized depth map by minimizing a functional.

The energy minimization process involves simultaneously estimating both the depth map (D) and the line field (b), which is computationally challenging. Unlike minimizing a quadratic potential function that can be quickly solved using a simple gradient method, edge-preserving regularization requires costly optimization methods such as simulated annealing and Markov chain Monte Carlo due to the nonconvex nature of the energy functionals.

To address this, alternate optimization methods are employed, such as graduated non-convexity, mean-field annealing, and ARTUR. These methods separate the estimation into two successive steps: minimizing the line field (b) and then the hidden label (D). An iterative process of alternate minimization is performed until convergence.

The algorithm utilizes a graph-cut method to approximate the solution for the nonconvex truncated Laplacian function in the energy minimization. The graph-cut method iteratively runs min-cut/max-flow algorithms on an appropriate graph to efficiently find a local minimum. It provides a labeling close to global solutions within a known factor. The convergence of the depth estimation sequence is ensured, and the iteration is performed enough times for good results.

Additionally, the algorithm requires the estimation of noise variances in the fusion model. A data-driven optimal estimation of the noise variances is developed by assuming Gaussian noise and using the maximum likelihood criterion.

Noise variances are found using.

A black text on a white background

Description automatically generated with low confidence

Time complexity: O (M^3 \* N)

For MDF noise and artifacts are removed from the image as they may interfere with the depth estimation and later applying color correction. The values for the multiple dept maps are estimated using stereo matching or depth from defocus. The depth maps get organized into scale space hierarchy each level having a different scale. The depth maps are then fused using different scales to obtain a single map using techniques such as weighted averaging or Laplacian pyramid blending. Now the image gets restored by applying depth-guided image enhancement techniques to reduce atmospheric haze and improve visibility. The techniques used are dark channel prior or color attenuation prior.

A screenshot of a computer

Description automatically generated with medium confidence