

**Title:** Pursuit of Accurate Semantic Pixel Labeling via Markov Random Field Optimization

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## **Research Background**

Semantic pixel labeling, which partitions a digital image into multiple semantic segments, is important for computationally understanding the real-world environment. Once it matured, this capability would enable applications such as safe autonomous driving and self-navigation of robots; therefore, it is wanted to improve the accuracy of such automated annotation. Recent advancement of deep convolutional neural networks (CNN) shows promising results by automatically learning discriminative features; however, the results still have the potential for further improvements.

## **Purpose of Study**

Our work aims at further improving the accuracy of semantic pixel labeling.

## **Methods**

We applied pairwise Markov Random Field (MRF) on top of the CNN output. Meanwhile, we optimized unary potentials and pairwise potentials, the two main potential functions of pairwise MRF models.

## **Results**

Visual improvements were obvious: CNN output's cleanness and smoothness improved significantly.

Statistical improvements were acceptable: global accuracy was improved by 0.131%; class average accuracy was improved by 0.015%; mean intersection over union (MIOU) accuracy was improved by 0.243%.

## **Conclusion**

Our optimization achieved initial success with space for further improvements.