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Pixel-wise Depth Based Intelligent Station for Inferring Fine-grained $PM_{2.5}$

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Abstract

Air pollution seriously affects people's lives, among which $PM_{2.5}$ is especially harmful for humans health. Although many countries have established air quality monitoring stations (AQMS) to monitor air pollution, the costs of constructing and maintaining for AQMS are extremely expensive and the density of AQMS is very low. Taking advantage of the artificial intelligence (AI) and the internet of things (IoT), we established image based intelligent station (IBIS) to monitor air pollution. To study the relationship between $PM_{2.5}$ concentration and images information, an IoT based smart systems has been established which has collected photos for consecutive 16 months. Furthermore, we utilize deep learning algorithms to acquire pixel-wise depth information. By combining Bayesian estimation with pixel-wise depth information, knowledge learned from well developed IBIS can be transferred to other newly built IBIS. The performance of the proposed method has been evaluated by real dataset. The results show that, compared with three baselines, our proposed algorithm can reduce up to 20% prediction error in average.

Keywords: pixel-wise depth, knowledge transfer, intelligent station, Bayesian

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