IMAGE-BASED PM2.5 ESTIMATION AND ITS APPLICATION ON DEPTH ESTIMATION

Jian Ma, Kun Li*, Yahong Han, Pufeng Du, Jingyul Yang
Tianjin University, Tianjin 300350, China

**Contribution**
- Development of an image-based method for real-time PM2.5 estimation by capturing a single image, instead of using expensive equipment.
- A depth estimation method with sparse prior and non-local bilateral kernel.
- More accurate depth estimation, especially in foul weather.

**Dataset**
- Captured images with ground-truth PM2.5 values.

**Method**
- Depth estimation using PM2.5 values.
  - Mathematical formulation:
    \[ d(x) = 1 - \frac{1}{\beta} n t(x) \] (1)
    where \( t(x) \) is initialized by dark channel prior and estimated using \( \beta \).
  - Optimized depth estimation function:
    \[ \bar{t}(x) = 1 - \omega \min_c \min_{y \in A(x)} I^c(y) A^c \] (2)
    \[ \beta = |aPM2.5 + b| \]

**Comparison with different kernel functions of SVR**

**Results on Synthetic Dataset**

**Results on Real Datasets**

**Contact:** Dr. Kun Li lik@tju.edu.cn

**Project Home page:** http://cs.tju.edu.cn/faculty/likun/projects/PM2.5