Title: An Integrated Approach of Belief Rule Base and Convolutional Neural Network to Monitor Air Quality in Shanghai
Expert Systems With Applications

As part of Reproducibility Badge Initiative (RBI), link of the code capsule, accepted by CodeOcean, is as follows:

https://codeocean.com/capsule/8827777/tree/v1

DOI of the compute capsule, published by CodeOcean, is as follows:

https://doi.org/10.24433/CO.8230207.v1

We implement our proposed integrated algorithm with Python 3 and C++ programming language. We process the satellite images with OpenCV library. Keras library functions are used to implement our customized VGG Net. We write
python script smallervggnet.py to build this VGG Net. Next, we train and test this network with a dataset of satellite images through train.py script. This dataset consists of 3-year satellite images of Oriental Pearl Tower,
Shanghai, China from Planet from January-2014 till December-2016 (Planet Team, 2017). These images are captured by PlanetScope, which is a constellation composed by approximately 120 optical satellites operated by Planet
(Planet Team, San Francisco, CA, USA, 2016). Based on the level of PM2.5, this dataset is divided into three classes: HighPM, MediumPM and LowPM. We classify a new satellite image (201612230949.png) with our trained VGG Net
by classify.py script. Standard file I/O is used to feed this classification output to the first BRBES (cnn_brb_1.cpp) through a text file (cnn_prediction.txt). In addition to VGG Net classification output, cloud percentage
and relative humidity are fed as input to first BRBES. We write cnn_brb_2.cpp to implement second BRBES, which takes the output of first BRBES, temperature and wind speed as its input. Wind direction based recalculation of
the output of second BRBES is also performed in this cpp file to compute the final monitoring value of PM2.5. We demonstrate this code architecture through a flow chart in Figure 5 of the manuscript. Source code and dataset
of the satellite images are made freely available through the published compute capsule (https://doi.org/10.24433/CO.8230207.v1).

References

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