Sky-View Factor Analysis for the Central Area of the University of Tsukuba Campus
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1. Motivation

In order to expound the Urban Heat Island (UHI) effect, we should not only take into account the orientation of the canyon, but also the temp phenomena (surface albedo, human activity emissivity and so on). Furthermore, the SVF is important measurement.

SVF ranges from the 0 to 1 and is calculated as the amount of sky visible when viewed from the ground up. Often a 'fish eye lens' photo is taken from the street level.

2. Background

Before this time, we have already done an UHI effect observation around the whole campus in Dec.23 2013. To explain the UHI effect obs. much more powerful, we used the SVF analytical method. As the figure 1 shows, the central area is the hotspot because of the huge difference in temperature.

Figure 1. UHI Obs. around campus (03.12.2013)

3. Methodology

With the iPhone Fish-Eye lens extension unit, we can get the sky view factor photos with GPS location. 254 photos (points) has been taken in the main road around central area (interval of two points is about 10 meter)

For the SVF computing, we used the object based image analysis (OBIA). As the Figure 2 shows, each photo will be classified into two types (sky and no sky) after multiresolution segmentation. And the way we used to analyze the SVF is IDW interpolation analysis (Figure 3).
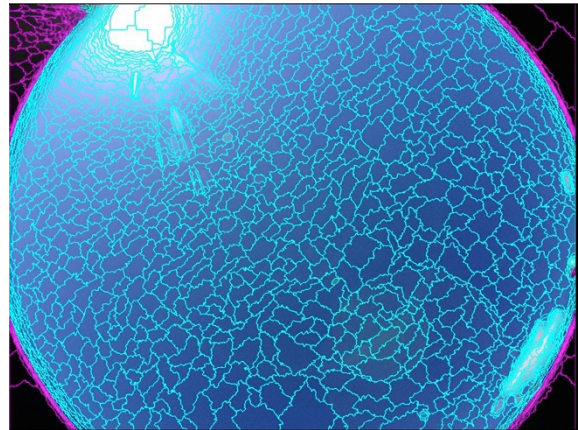

Figure 2. SVF used OBIA

Figure 3. SVF IDW analysis result

4. Results and Discussion

The higher the SKV (green color) is, the quicker the urban canyon will cool, because more air is available to absorb the heat retained by the buildings. With a low SVF (red color), the canyon can retain more heat during the day, creating a higher heat release from night to twilight.

Compare with the temperature observation and SVF results, we can find they have strong correlation. And I will use regression analysis to quantify the correlation in the future.