



Land Use Change and Climate Change Impact on Urban Heat Islands Development



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Abstract

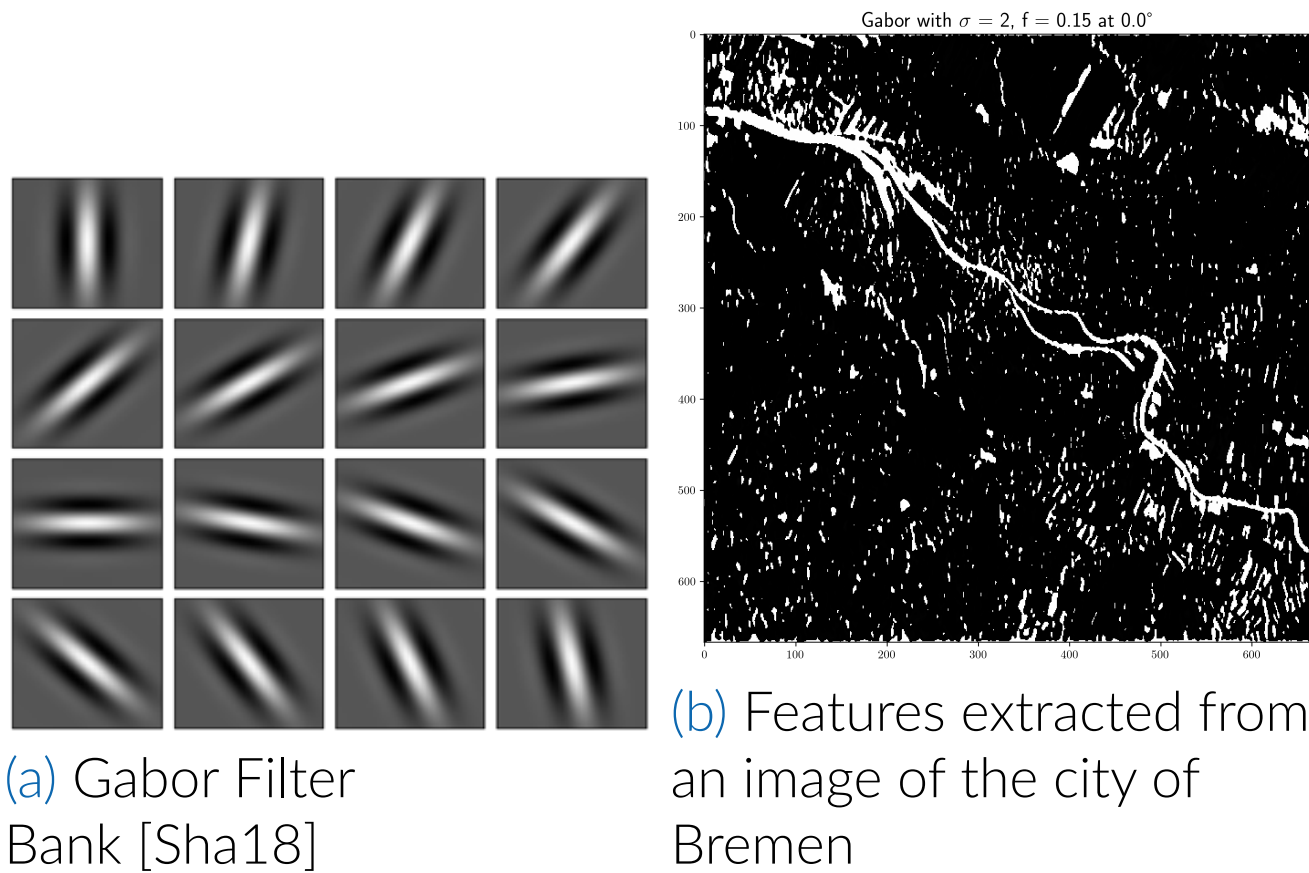
Urban Heat Islands are a phenomena where the temperature within a city is significantly higher within an urban area, compared to the temperature of the surrounding rural area. Detection using remote sensing data is used frequently. This Work adapted and combined different methods, to measure the impact of land use/ land cover change and longer term temperature changes on Urban Heat Islands in different European cities.

Processing Chain

The Image Processing Pipeline can be separated in these steps:

- **Preprocessing** Cutting the image area to the Area of Interested
- **Feature Engineering** A Gabor filter bank of rotated Gabor kernels is used to enrich pixels with information about there place in larger structures of the image
- **Image Classification** The pixels are classified using a random forest machine learning model that was trained using k-means based classification.
- **Urban Area Detection** Classes indicating Urban Areas are identified and the buffer zones are build up around the areas to calculate a reference temperature.
- **Peri-Urban Area Clean-up** Larger structures of small settlements are masked away from the surrounding areas
- **Detection of Urban Heat Islands** Using the Thermal Infrared channels of Landsat, Urban heat islands are detected within the Urban Area, using a minimum threshold above the rural surrounding area.
- **Statistical Analysis of UHIs** Pixel within the UHI and around are evaluated using land surface type, NDVI and NDBI indicies
- **Timeline Creation** Repeating this process for different images of the same area over multiple years, change in extend and size and statistical composition of the UHIs can be analysed. This allows an inside in the impact of urbanisation and change in surface type on UHIs.
- **Climate Change Impact** Estimation of the imapact of rising average temperatures is done by substracting the statistically significant impact of metrological and surface change on the size of urban heat islands and correlating the UHI size with measurement from weather stations in the area in question.

Feature Engineering



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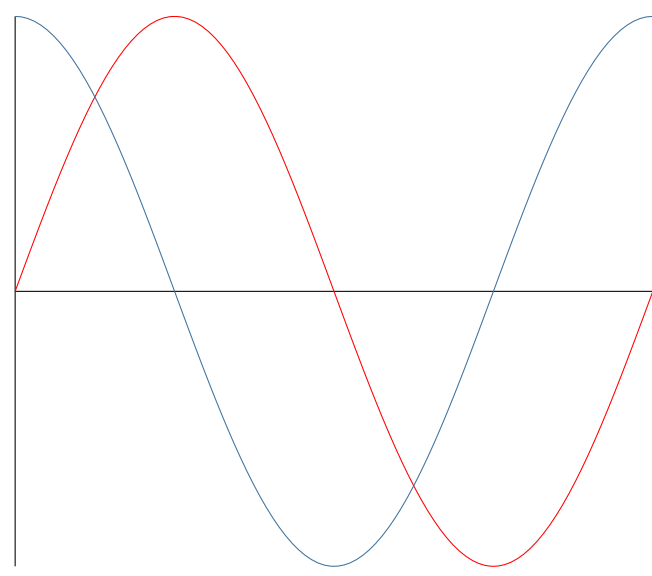


Figure 2. Another figure caption.

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Baz	3.14	83,742	δ
Qux	7.59	974	γ

Table 1. A table caption.

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References

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