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Usage of street-level imagery for city-wide graffiti mapping

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PROBLEM

- Graffiti commonly found in large urban centers
- It can be categorized into artistic drawings and tagging, as seen in the picture below. We are interested in the latter. Images obtained from [1].
- Such acts are seen as crimes and are combated by public authorities
- In 2017, the city hall of São Paulo, Brazil, enacted a law [2] that establishes high fees and combat to acts of graffiti against public heritage.
- The European Union maintain programs to understand and combat such acts [3].
- Identifying where the concentration of graffiti in the city are would be of great utility because it would allow auditing saturated regions (Broken Windows theory)
- There is currently no automatic way of obtaining a tagging map of the city

METHOD

- Use of street-level imagery
- Sampling the region of interest
- Identification of the region affected by graffiti on each image
- We use an aggregation metric by region

\[ g(R) = \frac{\sum_{j=1}^{n} \sum_{i=1}^{k} A_{ij}}{nk} \]

- We define the graffiti level \( g \) of a region \( R \) as the average of the graffiti levels of each sampled point. The graffiti level of each point is computed as the average affected area in each picture.

EXPERIMENTS

- Images from [1]
- We manually annotated 632 images and trained a method of segmentation of graffiti [4]
- Regularly-spaced grid over São Paulo

CONTRIBUTIONS

We propose a method to automatically compute the graffiti map of a city using computer vision over public images. We systematically collect data, train a segmentation algorithm and evaluate using the obtained dataset. We perform a case study in São Paulo, Brazil, and compare to socio-economical indicators.

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