Urban Weathering: Interactive Rendering of Polluted Cities

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Weathering effects are ubiquitous phenomena in cities. Buildings age and deteriorate over time as they interact with the environment. Pollution accumulating on facades is a particularly visible consequence of this. Even though relevant work has been done to produce impressive images of virtual urban environments including weathering effects, so far, no technique using a global approach has been proposed to deal with weathering effects.

Here, we propose a technique based on a fast physically-inspired approach, that focuses on modeling the changes in appearance due to pollution soiling on an urban scale. We consider pollution effects to depend on three main factors: wind, rain and sun exposure, and we take into account three intervening steps: deposition, reaction and washing. Using a low-cost pre-computation, we evaluate the pollution distribution throughout the city. Based on this and the use of screen-space operators, our method results in an efficient approach able to generate realistic images of urban scenes by combining the intervening factors at interactive rates. In addition, the pre-computation demands a reduced amount of memory to store the resulting pollution map and, as it is independent from scene complexity, it can suit large and complex models by adapting the map resolution.

http://dx.doi.org/10.1109/TVCG.2018.2794526