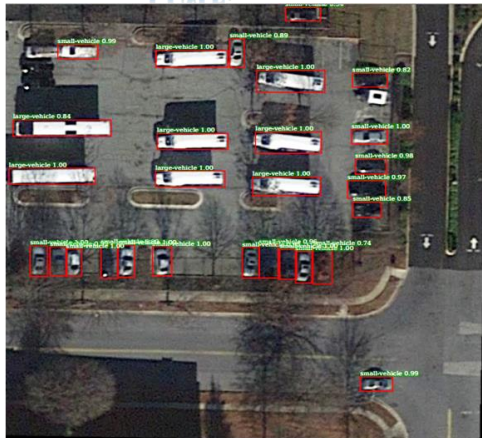
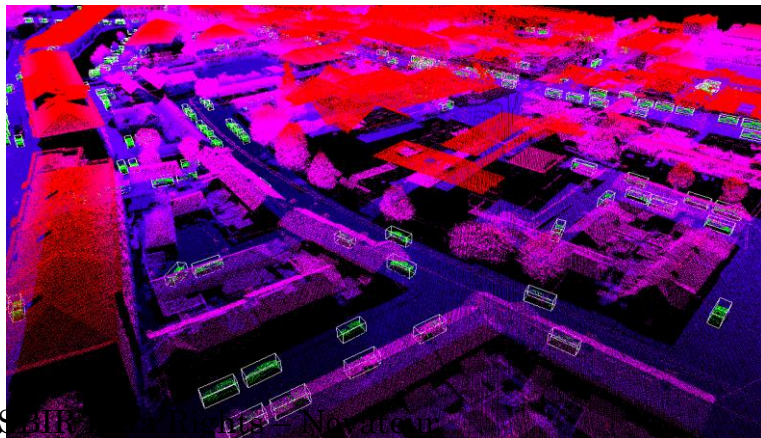
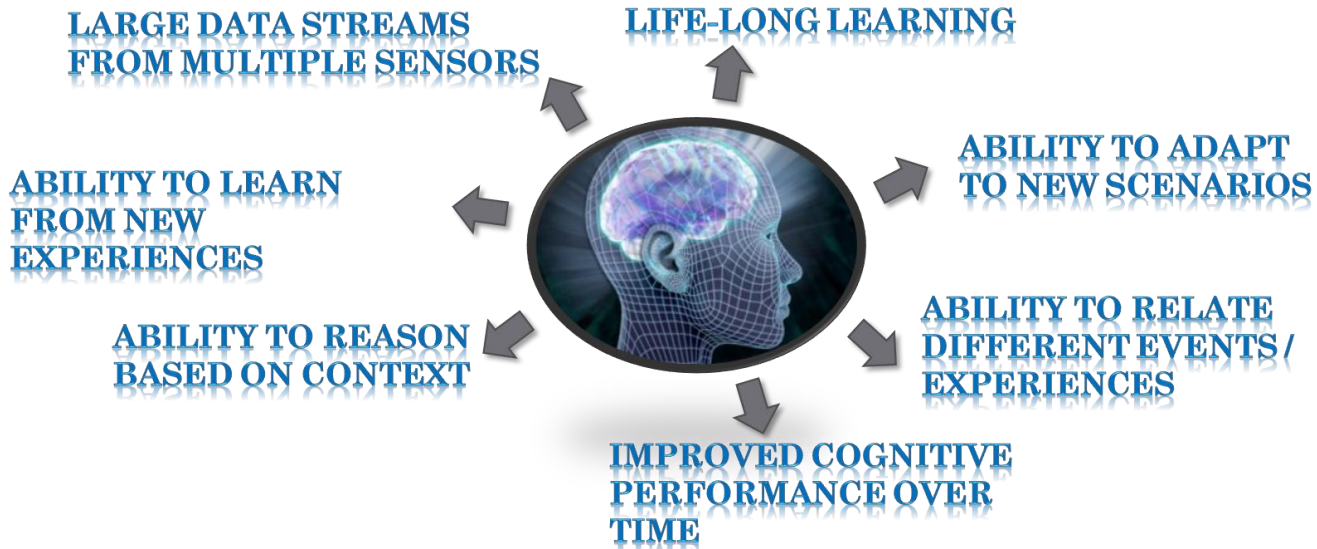


Long-Term Pattern of Life Analysis and Anomaly Detection

Khurram Hassan Shafique, PhD

NOVATEUR

Solving key machine learning and sensor exploitation challenges to enable **smart autonomous systems**



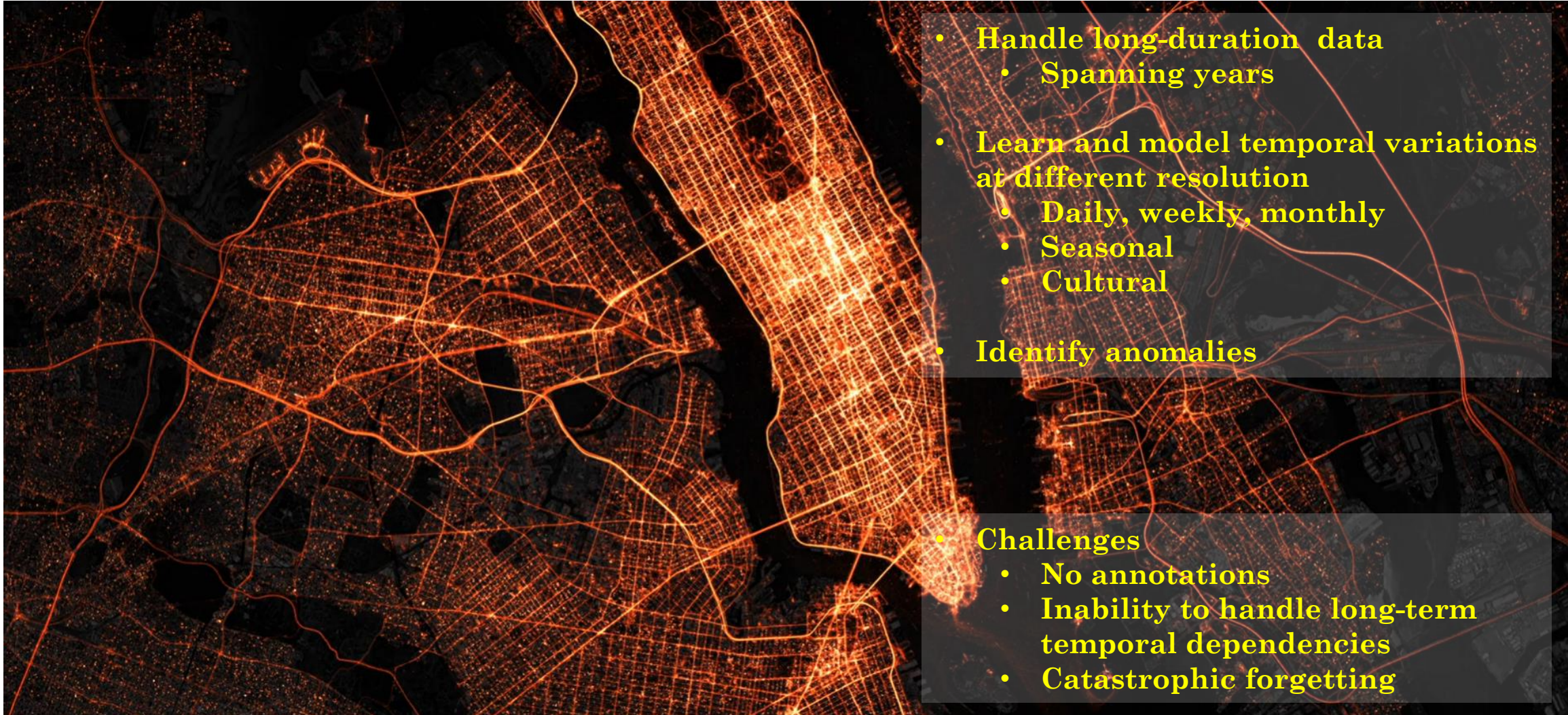
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Patterns of Life

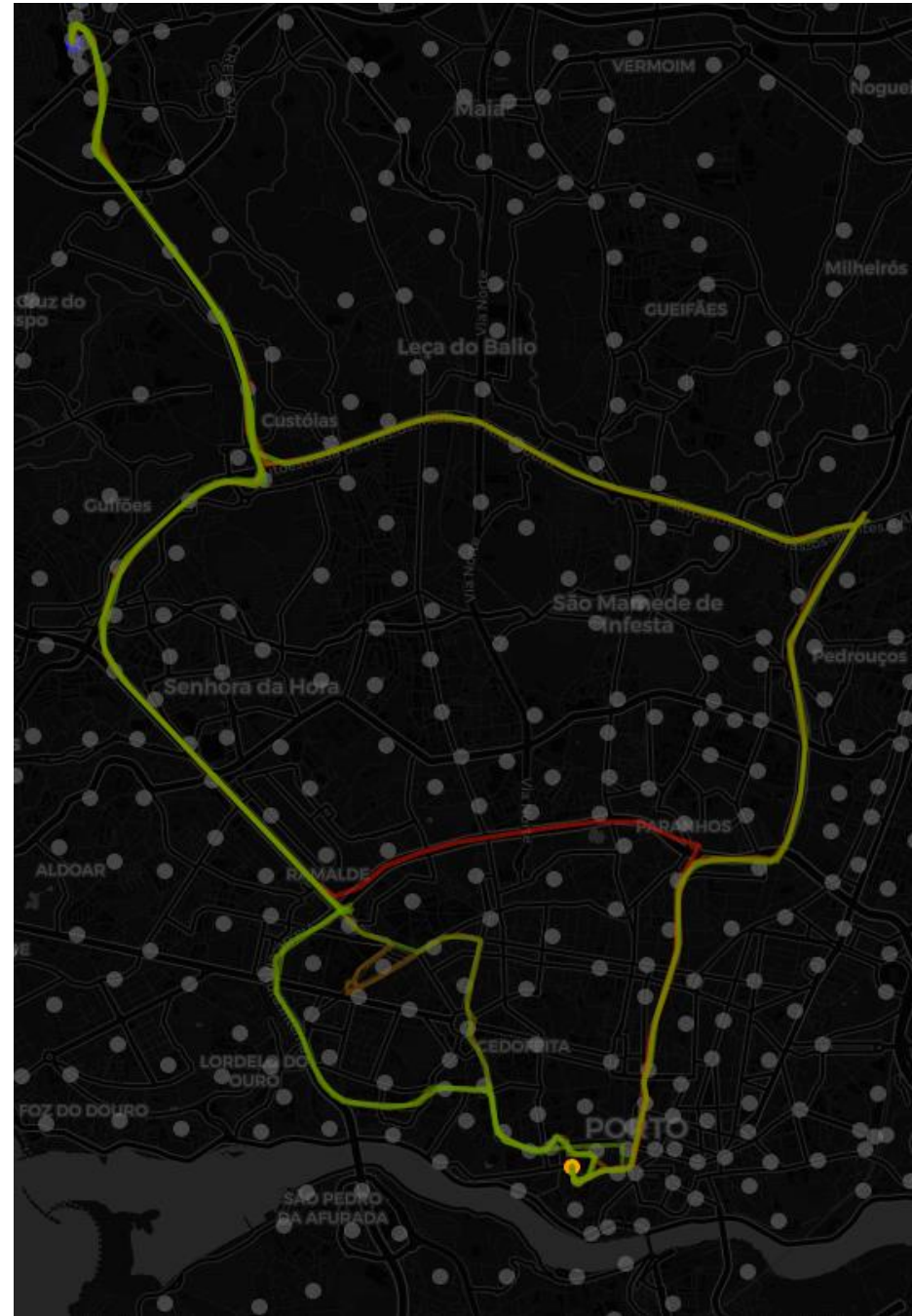
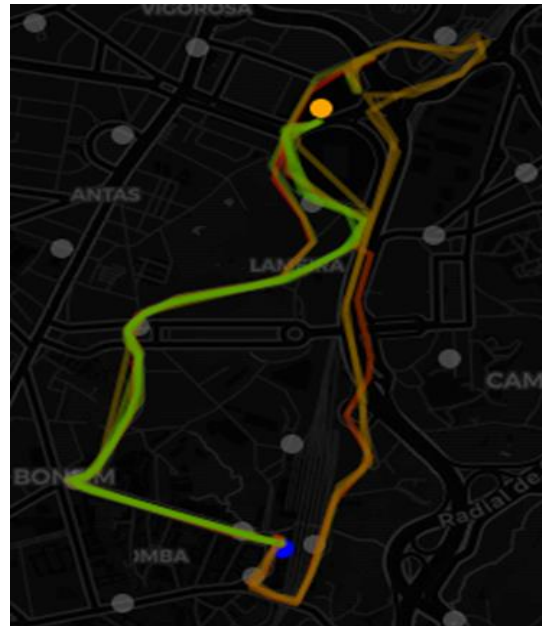
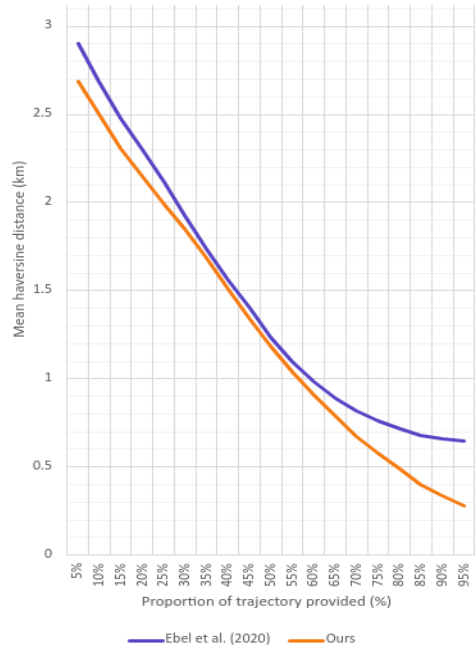
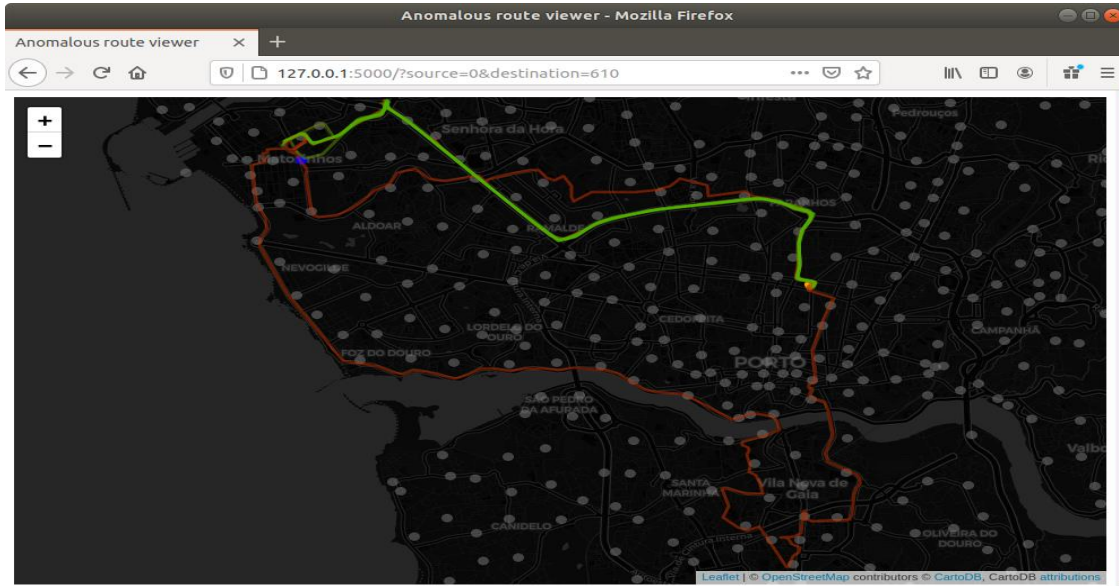
- 
- **Handle long-duration data**
 - **Spanning years**
 - **Learn and model temporal variations at different resolution**
 - **Daily, weekly, monthly**
 - **Seasonal**
 - **Cultural**
 - **Identify anomalies**

Patterns of Life

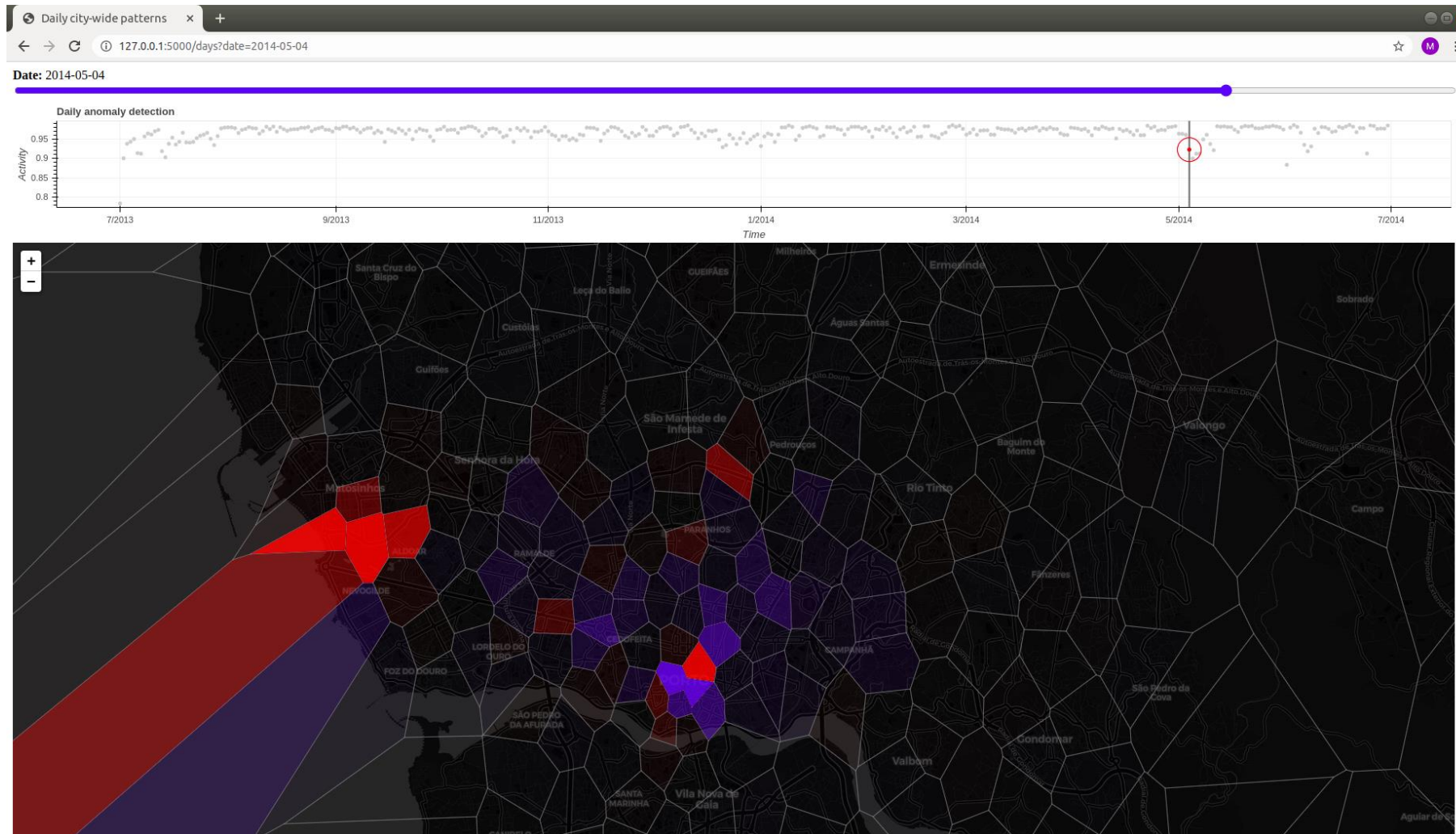


- **Handle long-duration data**
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 - **Daily, weekly, monthly**
 - **Seasonal**
 - **Cultural**
- **Identify anomalies**
- **Challenges**
 - **No annotations**
 - **Inability to handle long-term temporal dependencies**
 - **Catastrophic forgetting**

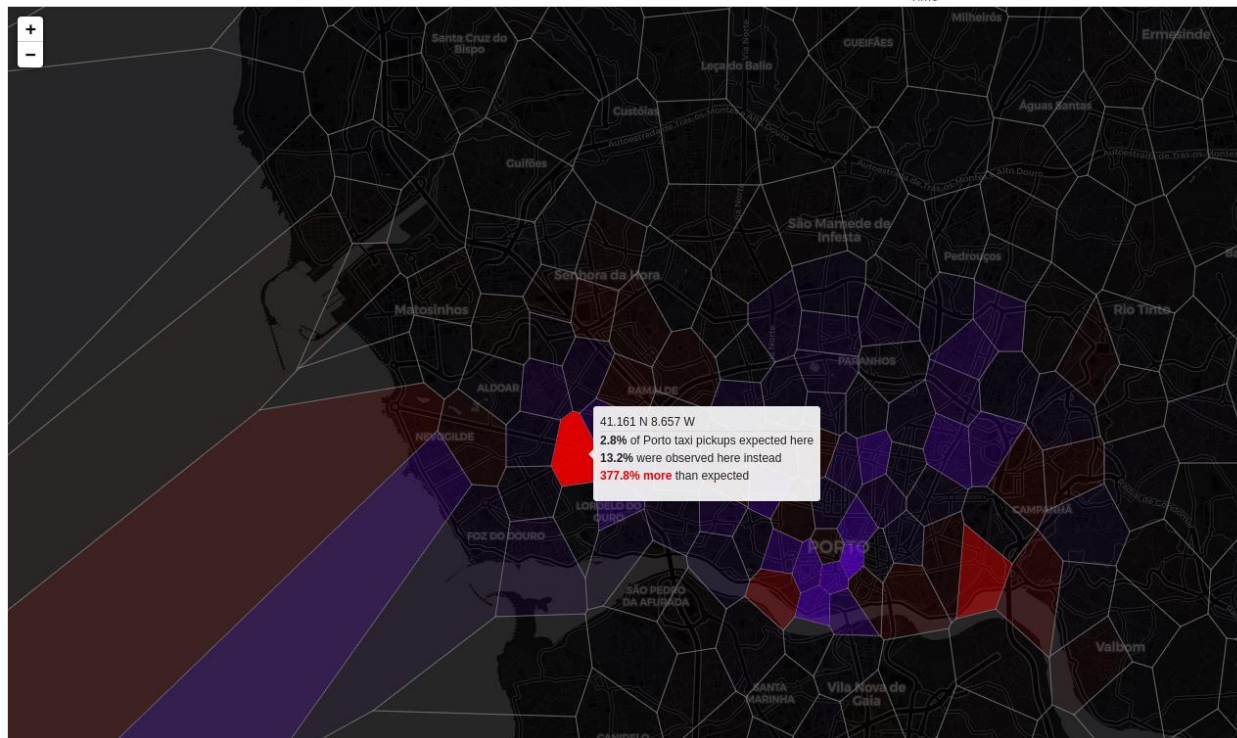
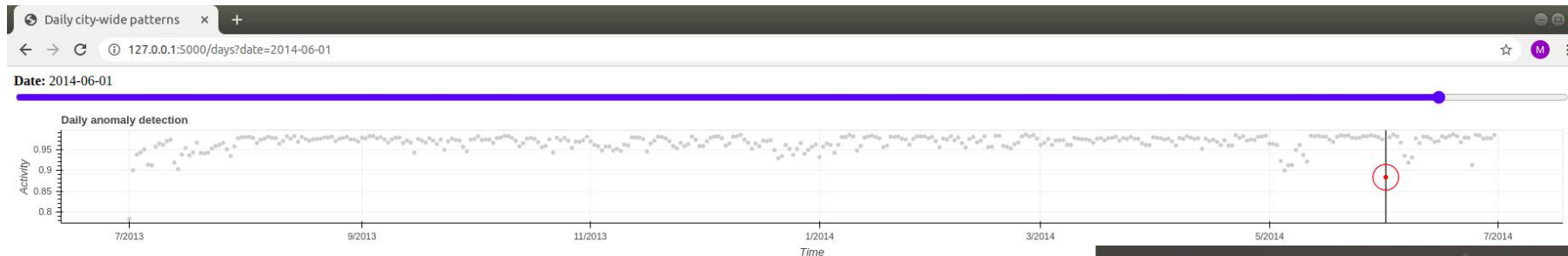
Track Anomalies



Detecting city-wide anomalies



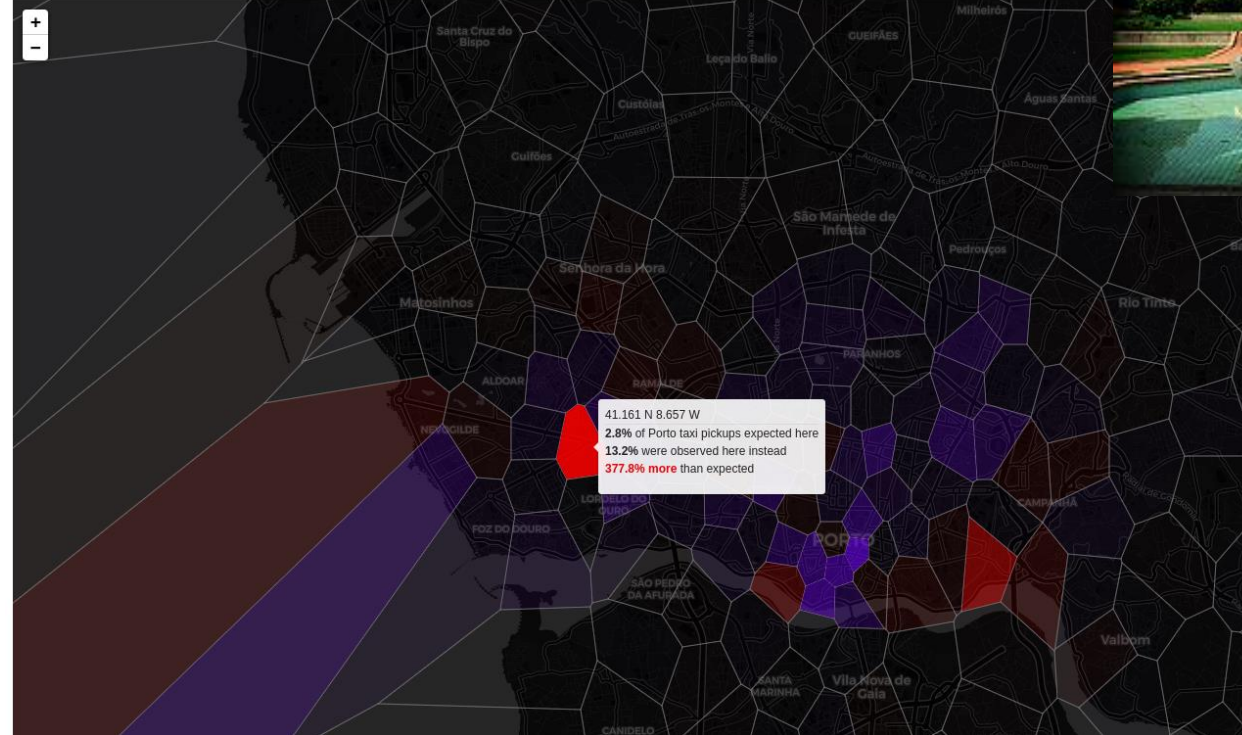
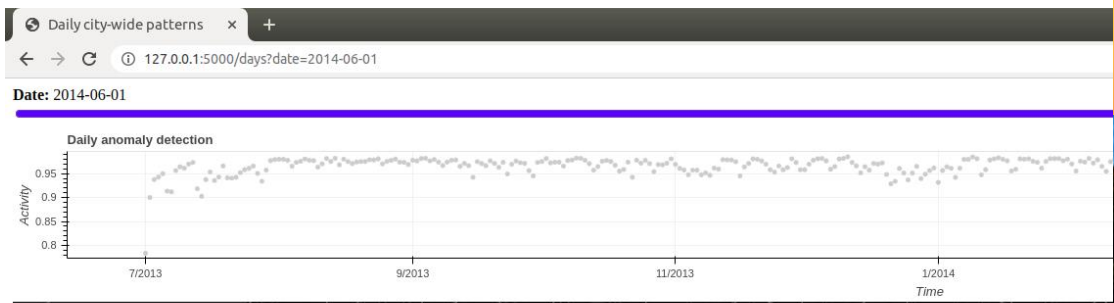
Detecting city-wide anomalies



Festa de São João do Porto (St. John's Day) June 23, 2014



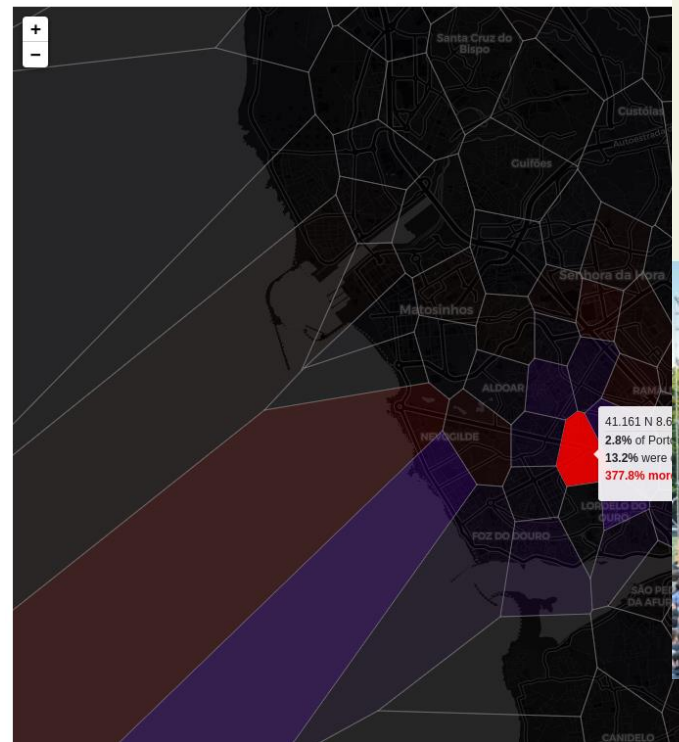
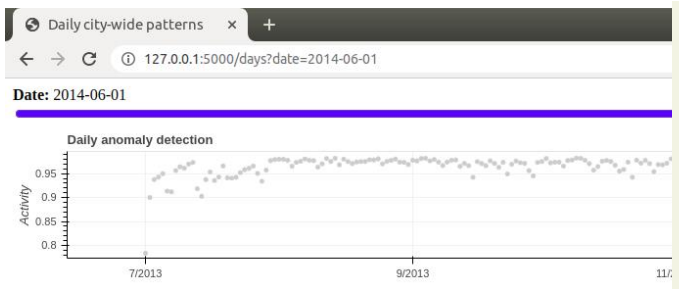
Detecting city-wide anomalies



to (St. John's



Detecting city-wide anomalies



to (St. John's



Cultural events from pedestrian behavior



Cultural events from pedestrian behavior



Cultural events from pedestrian behavior

Mosjøen sentrum Sat Sep 25 2010 13:07:40



Tiendebytte 2010



Bysprinten Mosjøen 2011

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