Can GIS be used to model Pedestrians in Manhattan?

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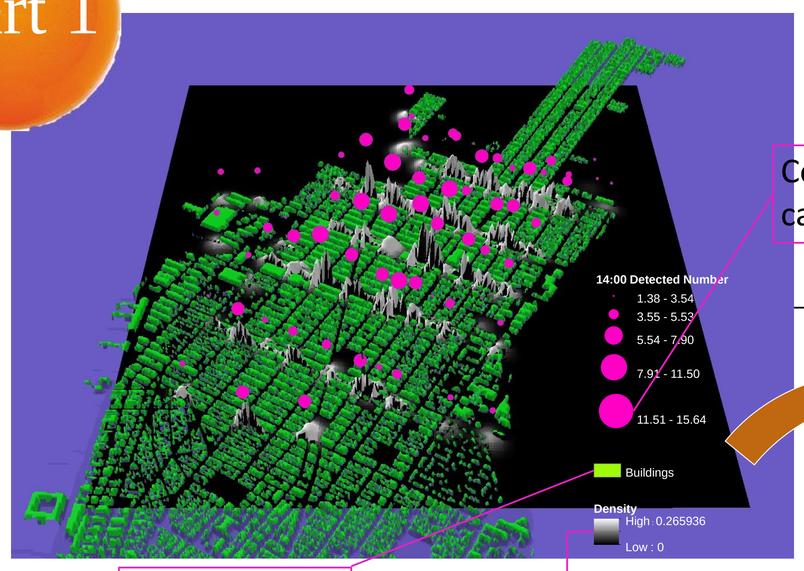
Part 1

3D Model Overview



Count for each camera

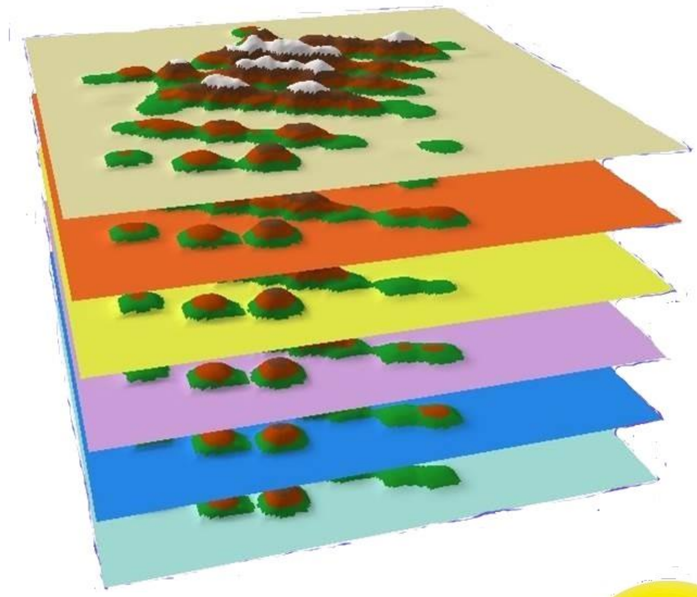
Barriers for Kernel Surface

Kernel Density Surface

Spatial Mean → Focal Statistic (mean) → Temporal Mean → Cell Statistic (mean)

Spatio-temporal Mean

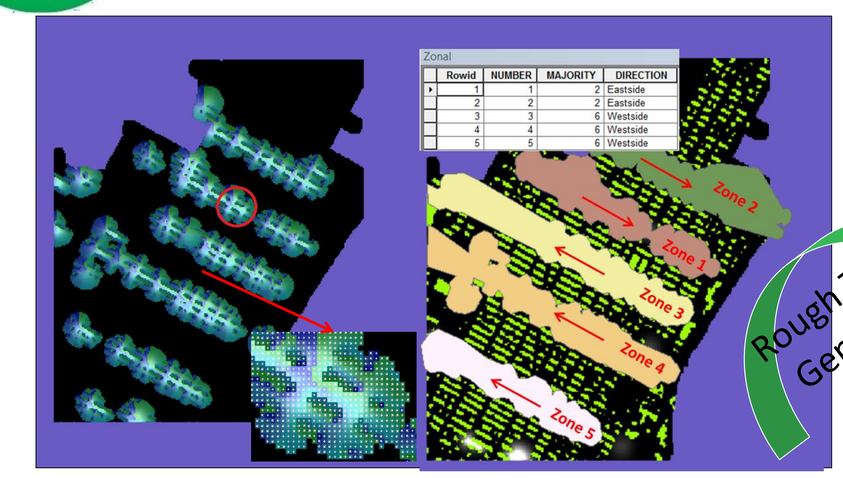
Spatio-temporal Result



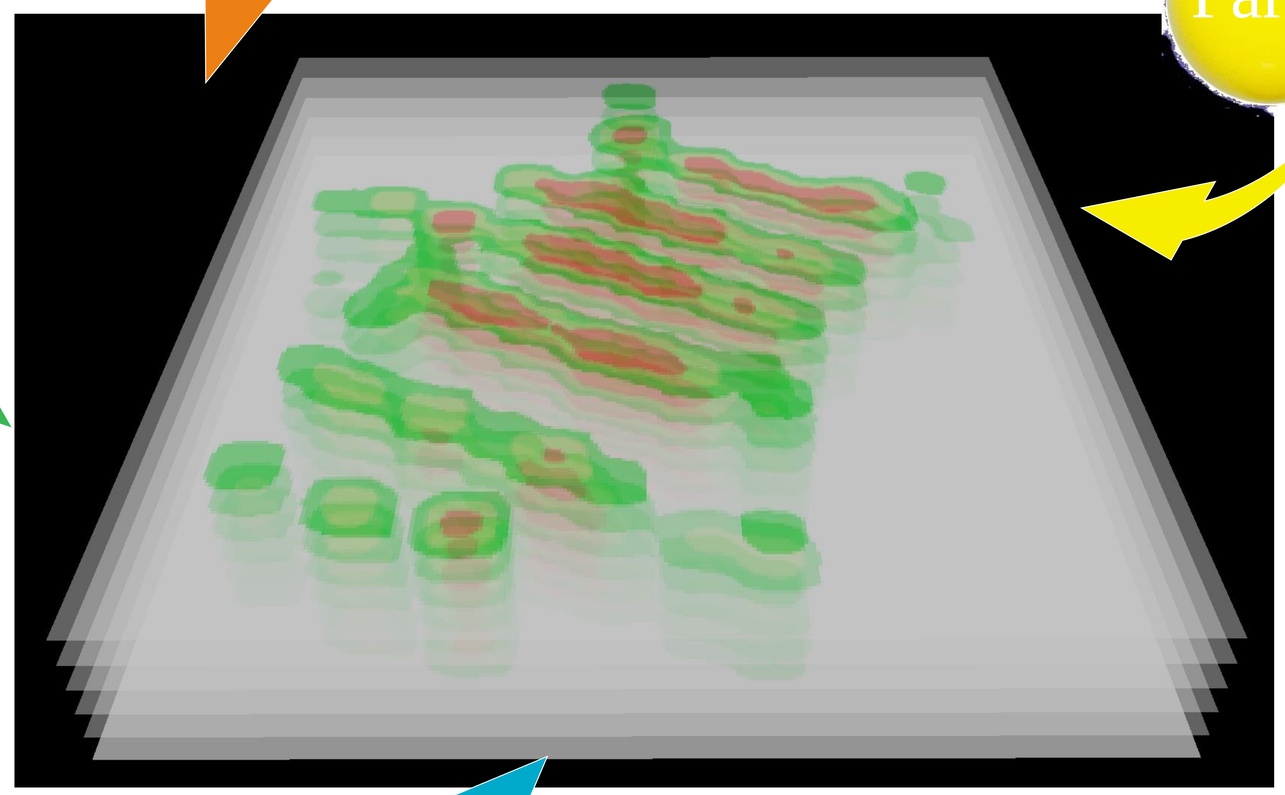
Part 3

Part 2

Street-based Direction

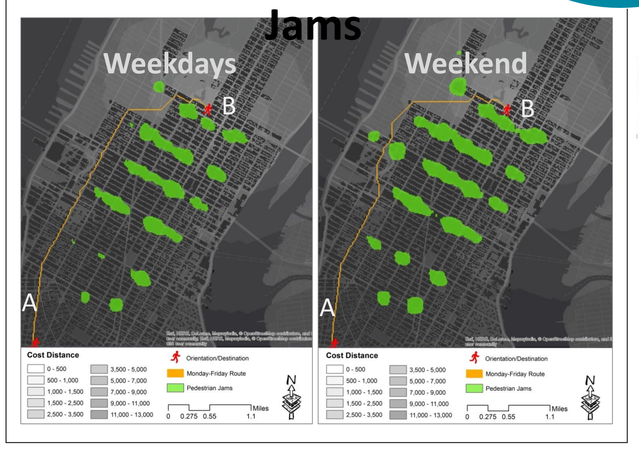


Rough Trends Generation



Application

Route Avoiding Jams



Part 4

Route with Dynamic Frictions

1 Stated Problem

If you watch at a spot, you can see how many people around you; if you spend more time watching, you may know which direction most people are heading for. However, when I want to know what the pedestrians in a city look like, nobody can give me an answer from single spot.

Fortunately, Placemeter Company discovered a way to let camera watch towards the streets and count pedestrians for each hour. They share me the data to help me research on whether I can model pedestrians with GIS.

2 Logic Structure

I. Map The Data
- CSV -> Point Feature Layer -> Raster layer
- Interpolation / Density Method Selection
- 3 D Model Overview

II. Trends Generation
- Street Based Model
- Rough Trends Generation

III. Clustering Generation
- Spatial Clustering Identify
- Temporal Factor Consideration
- Result Analysis

IV. Application & Development
- Walking Route Generation
- Biking Route Assumption

3 Methodology & Explanation

I. The project is based on Raster Data. This is because in raster way, there is more freedom in defining and create networks and connections in map. It is more proper when solving pedestrian problems.

II. The project assumes pedestrians cannot go inside buildings in Manhattan. In real world, there are many kinds of barriers for pedestrians like rivers, fences and walls. By setting buildings as barrier, I'm showing one of the possible factors that shape pedestrians' potential and borderless "roads"

4 Analysis & Results

Use GIS technique, I can create a surface model to describe the pedestrian density with temporal and spatial information. The accuracy de pends on the camera records' frequency and camera station number.
In Manhattan, although slightly different, the generalized spatio-temporal results from Monday to Friday share a similar pattern, which can be evident when piling layers up. The clustering areas would increase on Saturday and they are moving northward towards the Center Park.
With GIS, I can have a knowledge and I'm trying capture the pedestrians' moving pattern. It's important to know Pedestrian information as a reference in many traffic cases or other urban problems. I believe this is a good start to solve this problem by trying combine Computer Vision and GIS technologies.