

OVERVIEW



The **Spatial Bros** is created to **assist non-technical savvy users** in performing geographical point pattern analysis. Our application will assist users with **Spatial Points Analysis**.

For each of the analyses, the application will provide users with **kernel density maps, 1st and 2nd order** will provide and perform types of hypothesis testing to allow users to generate insights towards statistical conclusions on the distribution of spatial points along networks.

PROBLEM & MOTIVATION



Problem

Not many people are knowledgeable and trained to perform **Geospatial & Aspatial** analysis. Without the fundamental knowledge and appropriate training, any results based on the analysis performed could be inaccurate.

Motivation

Hence, our group's main focus is to perform our analysis and develop a web-based geospatial tool on **Melbourne City, Australia** using R Shiny with regards to Point Pattern Analysis particularly on **Network-Constrained Point Pattern Analysis (NCPA)** and **1st/2nd Order Spatial Point Patterns Analysis (KDE, G and K function estimation)**. We hope this application can **empower and educate** users and conduct the analysis they want regardless of their technical expertise to gain further insights from geospatial data.

ABOUT CITY OF MELBOURNE



- Melbourne is located in the state of Victoria, in southeastern Australia. The city of Melbourne is situated on the northern bank of the Yarra River. Here are some of the districts and suburbs surrounding Melbourne:
- Carlton
- Docklands
- East Melbourne

WHY CITY OF MELBOURNE ?

- **Urban environment:** Melbourne is a highly urbanized city, which presents a unique environment for spatial point analysis.
- **Well-documented data:** Melbourne has a well-established research infrastructure with extensive data available on land use, vegetation, and climate
- **Ecological diversity:** Despite being an urban environment, Melbourne has a wide variety of ecological environments, from urban parks to coastal wetlands.

METHODOLOGY



Data selection

Datasets from Australian Bureau of Statistics:

- Localities Outline for Australia (to filter out City of Melbourne)
- LGA Outline for Australia (to use to filter out City of Melbourne Localities)

Datasets from City of Melbourne

Open Data:

- Pedestrian
- Roads
- Trams
- Business establishments location and industry classification
- Landmarks and places of interest
- Drinking Fountain
- Public Toilet
- Childcare Centres

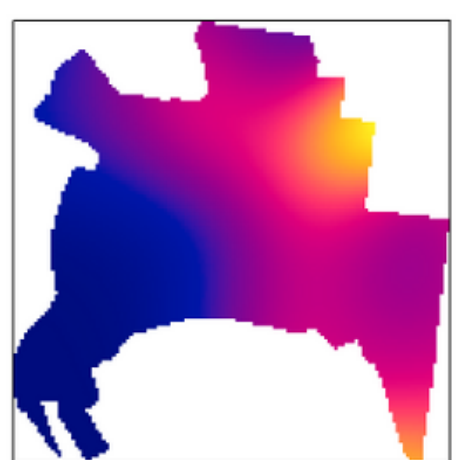
Data preparation

- To source and assemble data from various sources out there
- Importing the Spatial Data (Geospatial)
- Data Wrangling

1ST/2ND ORDER SPATIAL POINT PATTERNS ANALYSIS

Kernel Density Estimation

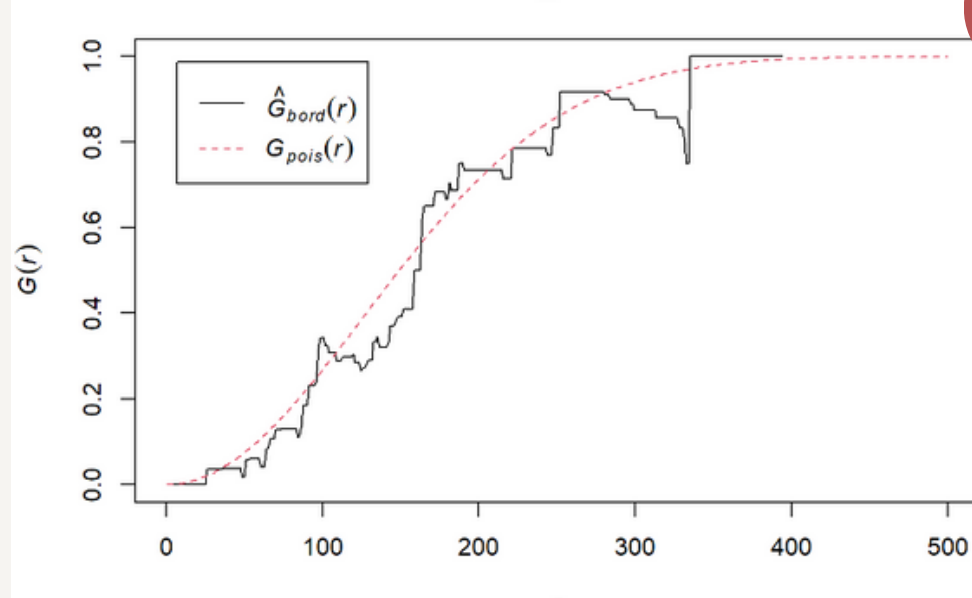
kde_childcareMB_adaptive



CHILD CARE CENTRES

G Function Estimation

G_CK

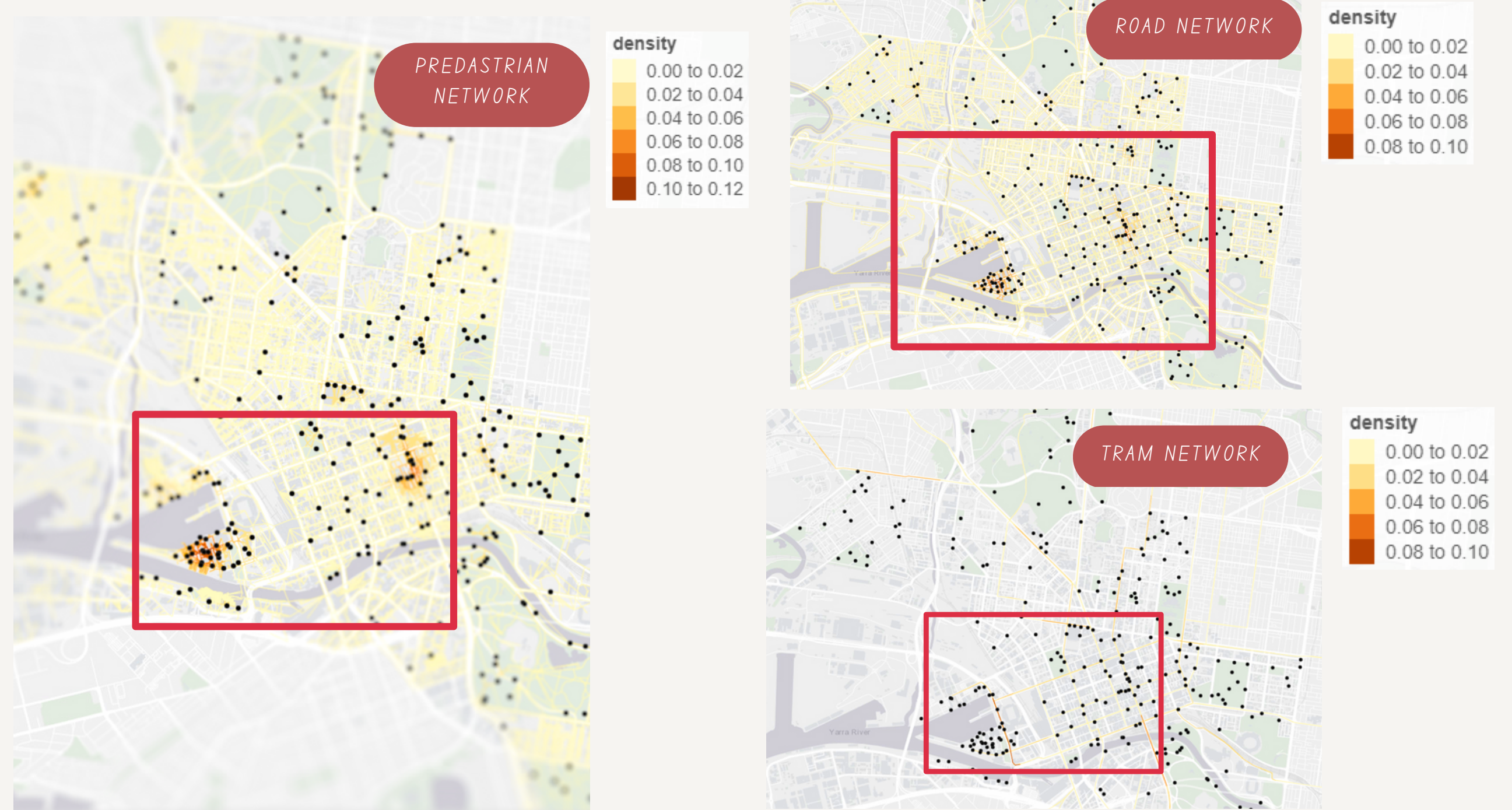


CHILD CARE CENTRES

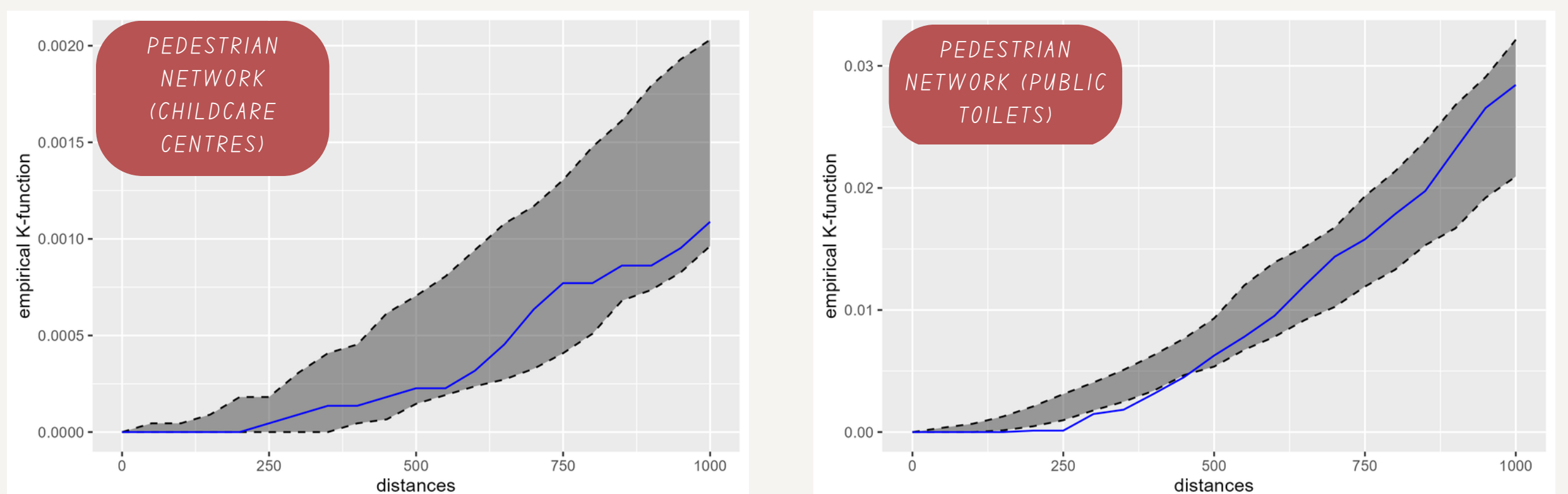
NETWORK-CONSTRAINED POINT PATTERN ANALYSIS (NCPA)



Network Constrained KDE (NetKDE) Analysis



G & K Function



FUTURE WORKS



An expansion our team can look beyond is to **divide our researched and visualization results into separate pages**. In future works, we hope to be able to **further enhance data democratization** by allowing the import of any network and dataset in the world to understand data in their region. Side-by-side analysis could be included to help understand the various urban typologies across cities and the differing distributions of spatial points across cities.

VISUALISATION TOOLS



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