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Network Distance Based
Ecofriendly Walk Score Calculator

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Division of Spatial Information Science
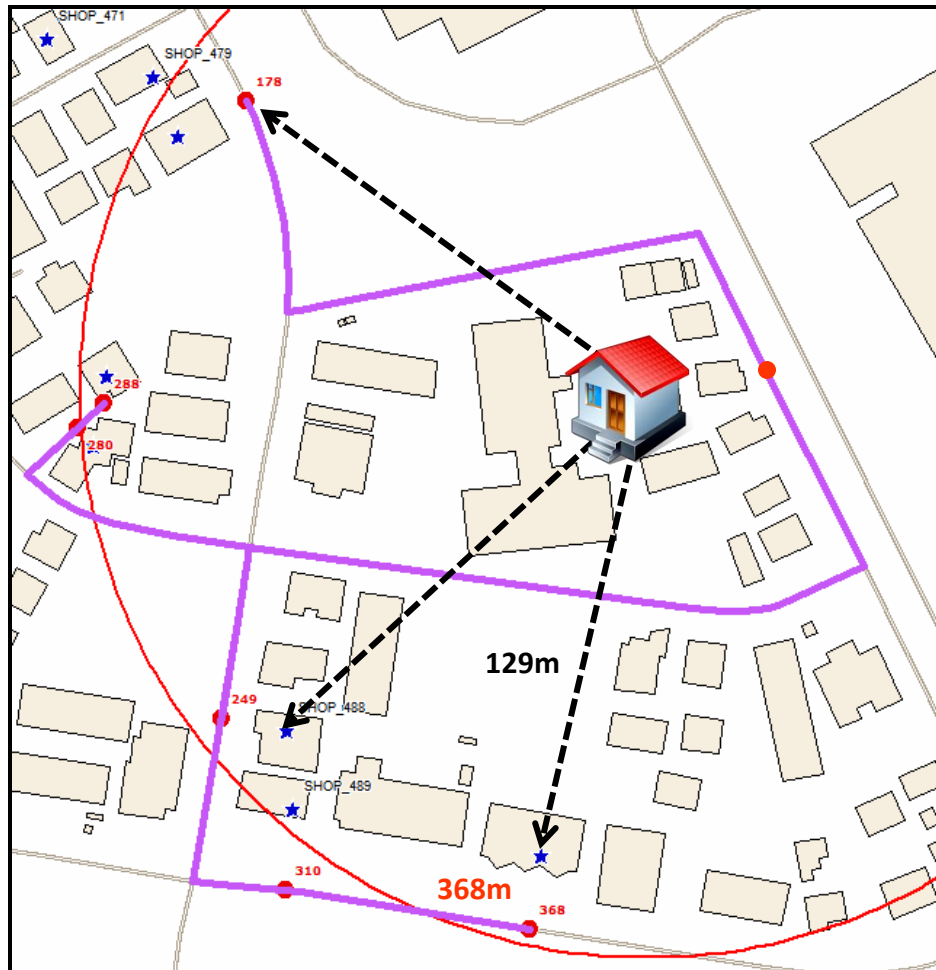Graduate School of Life and Environmental Sciences
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Contents

Straight Line Distance Vs. Network Distance

Straight line distance
Euclidean distance
Crow-flies distance

Network distance
_____

Retail market analysis
Service allocation
Facility planning
Transportation planning
Garbage collection
Time-space geography
(Travelling time/distance)
more …

Network Data Model

Network

An interconnected **set of points and lines** that represent possible routes from one location to another. (ESRI)

e.g. road network, river network, etc.

Network Data Sources

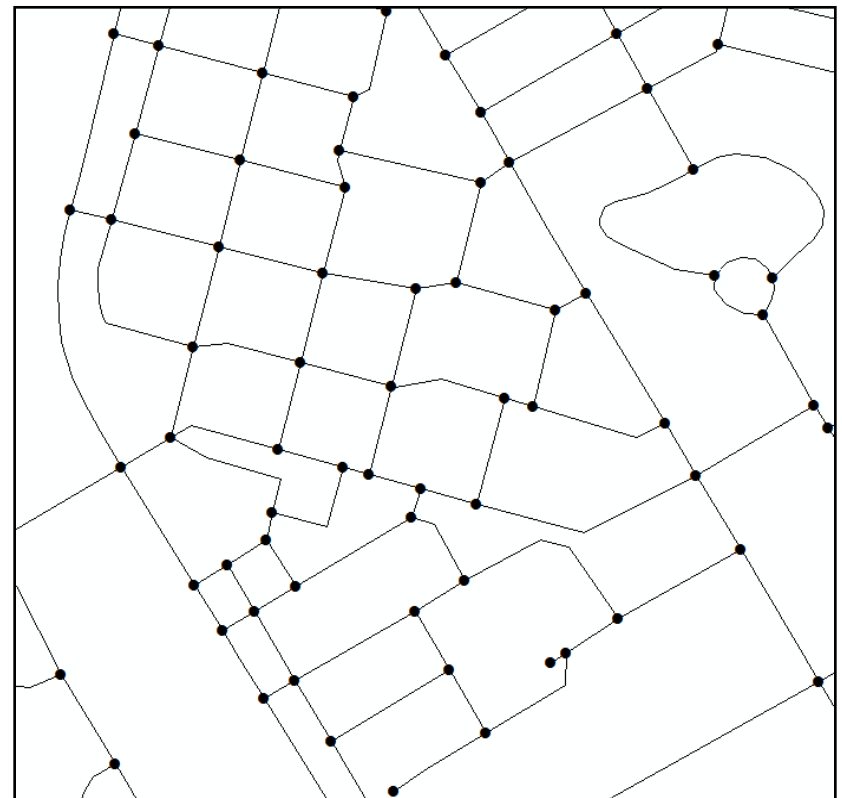Road center lines (from map vendors)
Manual digitizing on road maps
High resolution satellite images
(edge detection, not practical)

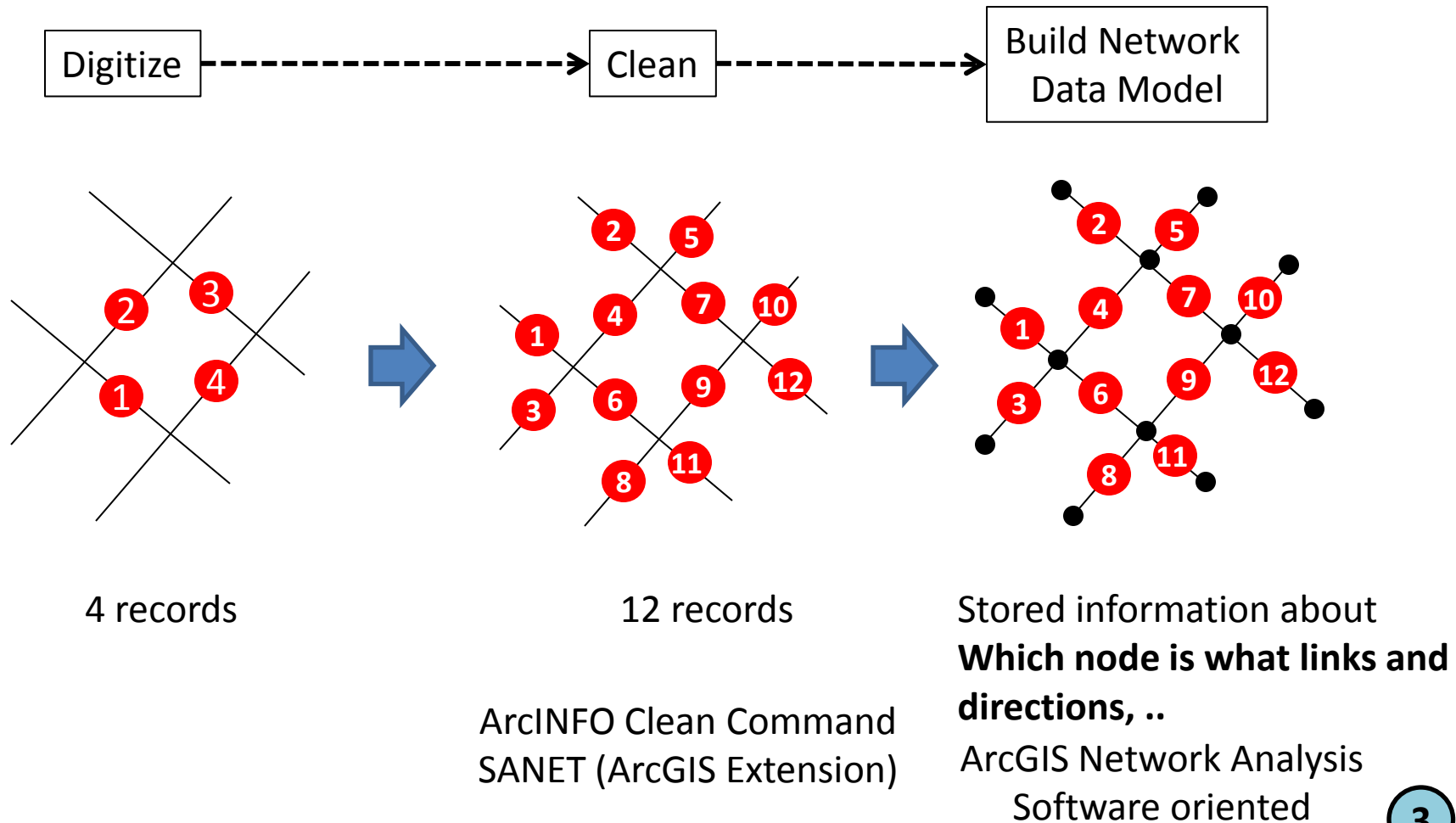***For Tsukuba City***

GSI data + Zenrin Data + Manual Digitizing
GSI = Road center, does not cover small roads
Zenrin = Only road outlines

Network Data Model

Network Data Model

Digitize ------> Clean ------> Build Network Data Model

4 records

12 records

ArcINFO Clean Command
SANET (ArcGIS Extension)

Stored information about
Which node is what links and directions, ..
ArcGIS Network Analysis
Software oriented

Applications

Numerous ..

At least we can perform "Shortest Path Analysis" without any attribute information.

End

Start
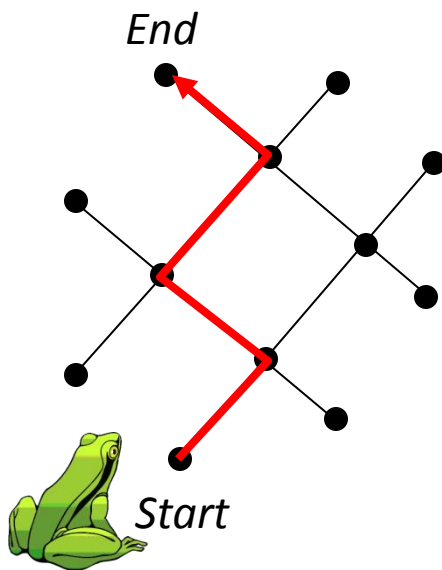
If we have additional attribute information such as:

Speed limitation per road	*shortest vs. quickest*
Number of accidents per road	*shortest vs. safest*
Number of crimes per road	*shortest vs. safest*
more	

Exceptions

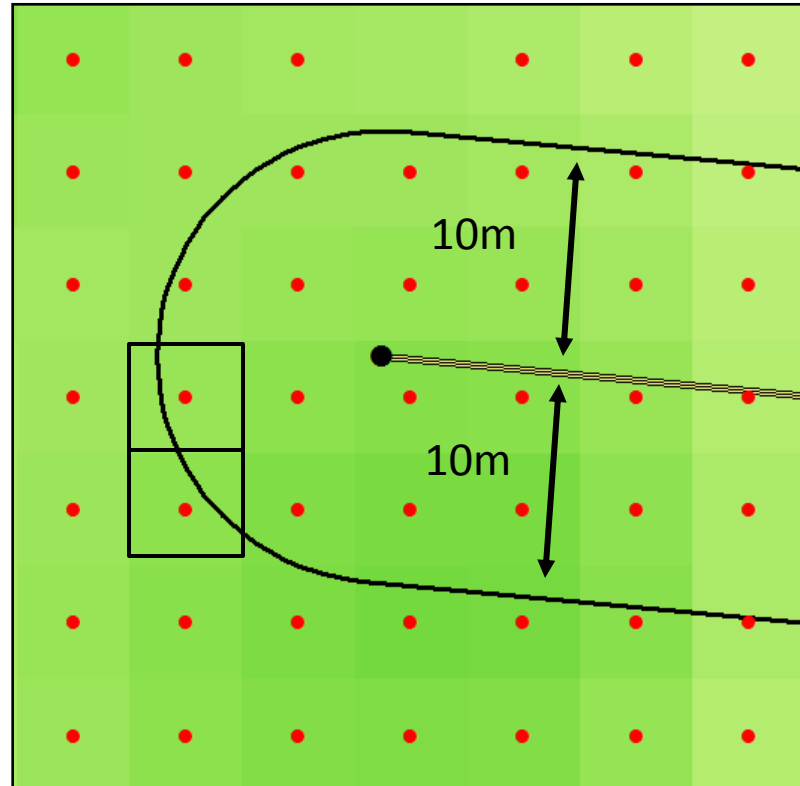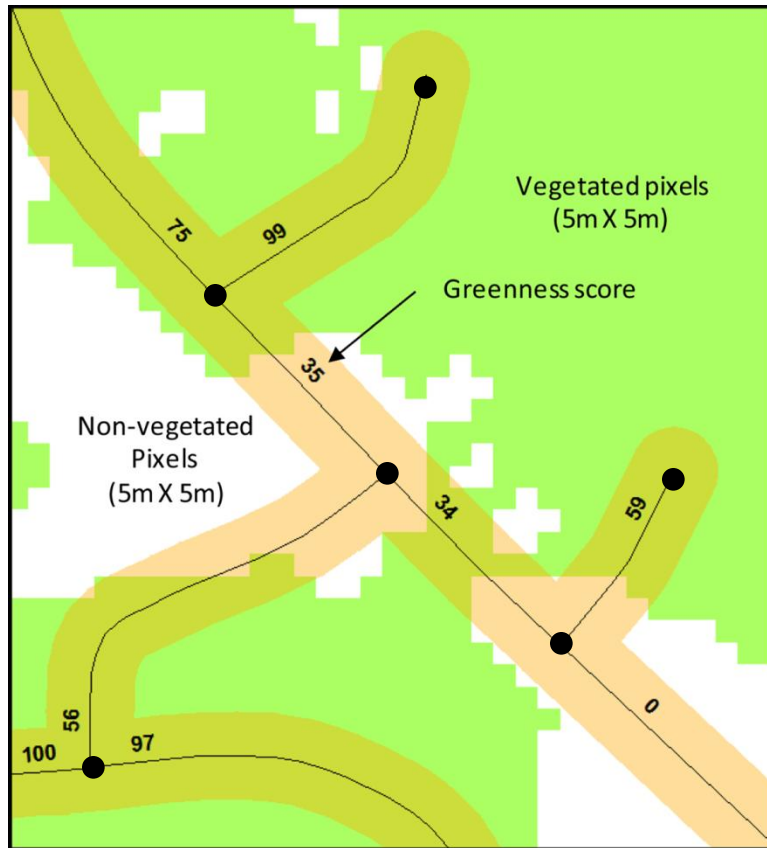Pattern analysis (*clustered or dispersed*)
Post disaster studies (*roads are broken*)
But really important for pre-disaster
(*Simulate different disaster scenarios for emergency preparedness*)

Shortest Vs. Greenest
Calculation of greenness score

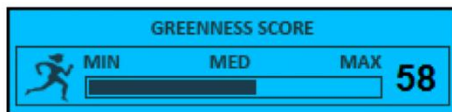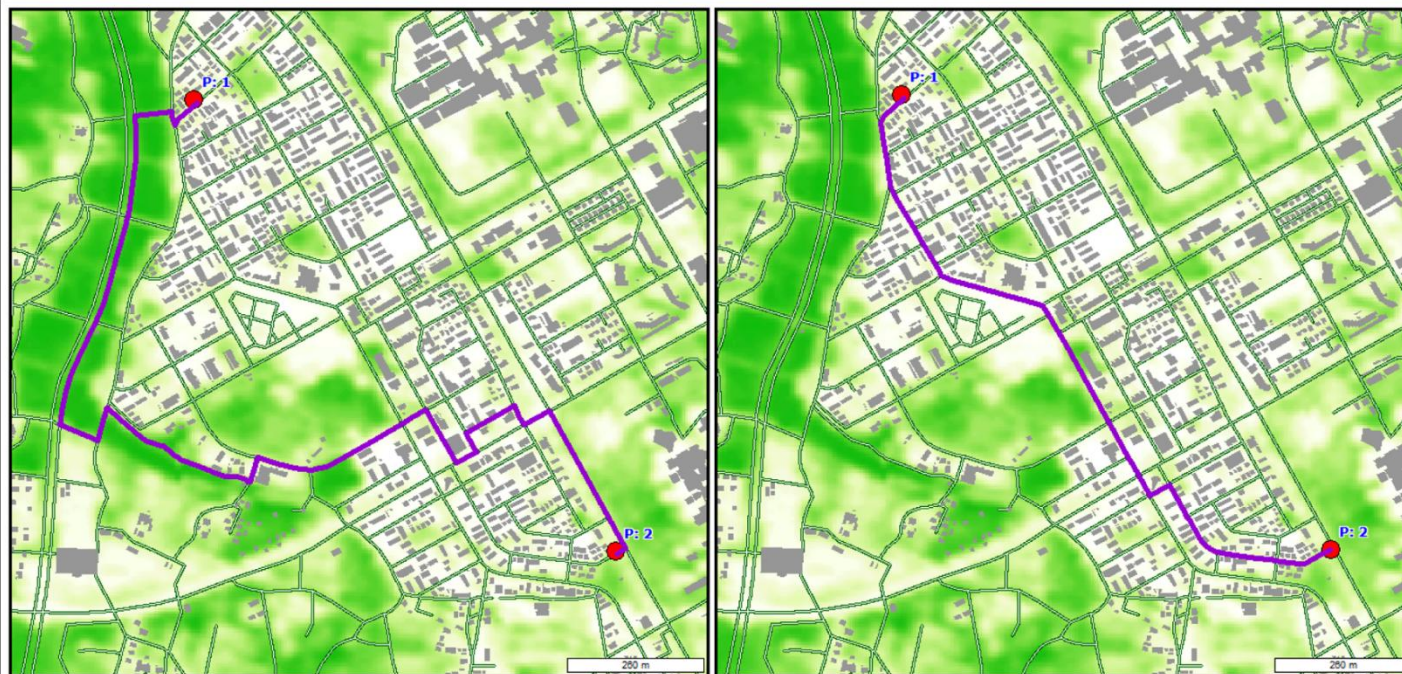Vegetated pixels
(5m X 5m)

Greenness score

Non-vegetated
Pixels
(5m X 5m)

10m

10m

ALOS re-sampled to 5m
To reduce errors between vector and raster

Greenness Score = (Vegetated area in the 10-m buffered road/Road buffered area) * 100
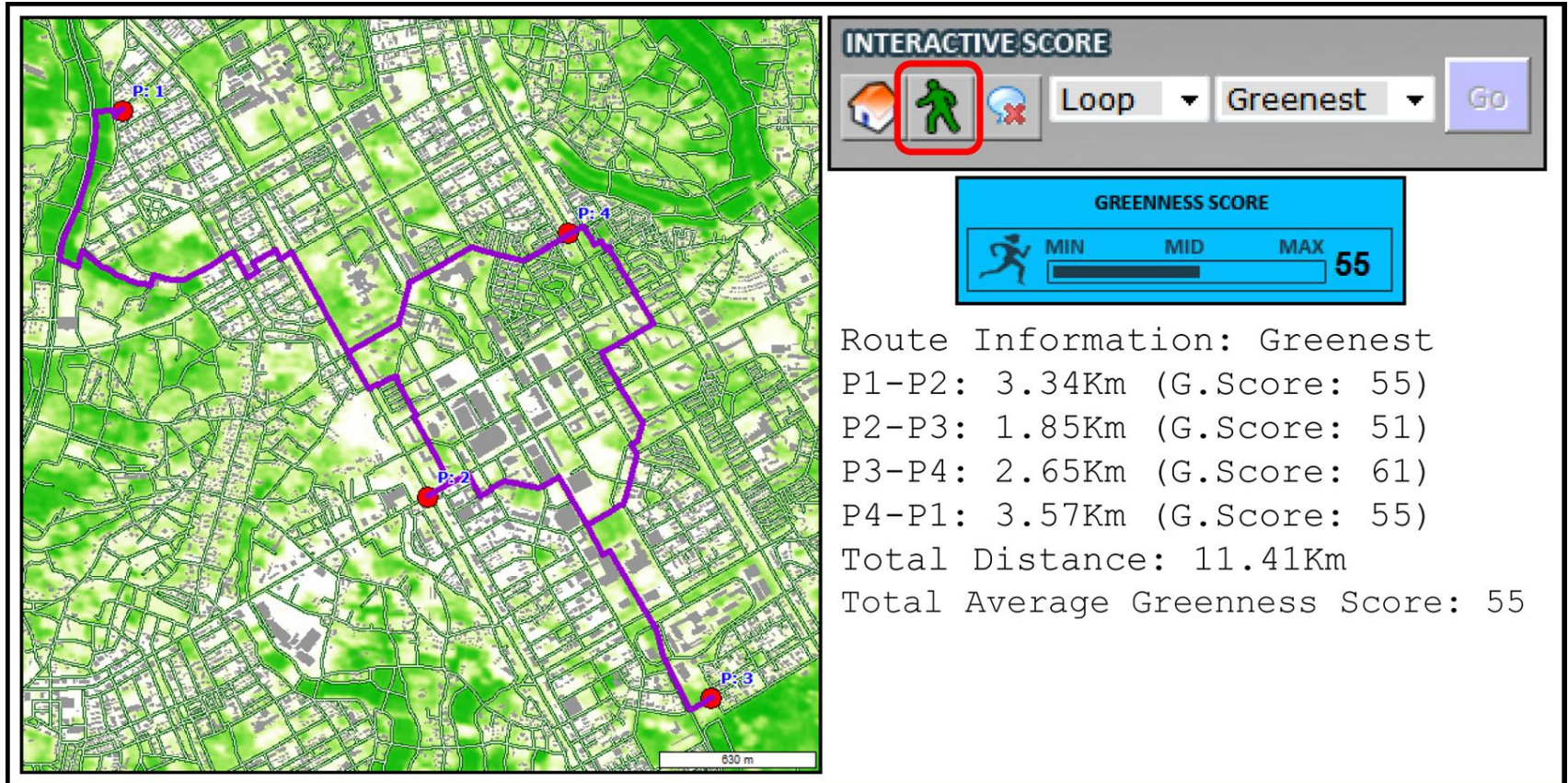
Shortest Vs. Greenest

Shortest

Greenest

Shortest Path Vs. Greenest Path Analysis

Multiple points/places
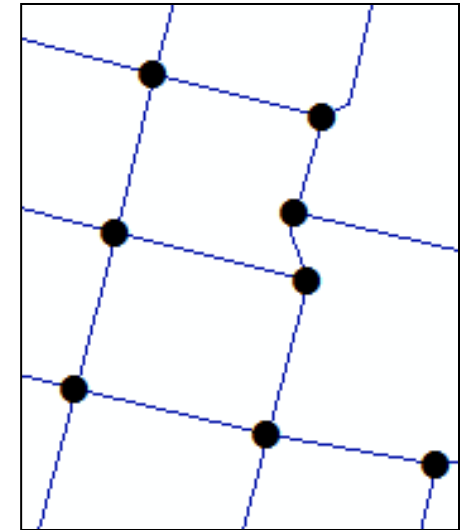
Network Data is important

Time and space/distance sensitive researches

Applications are numerous
Retail market analysis, urban planning,
transportation planning, emergency preparedness, etc.

Essential for connectivity studies
Average block/street length, number of connected nodes, …

Integrates with other remote sensing data or GIS dataset
(crimes, accidents, speed limitations, traffic volume, greenness, …)

Thank You