



AGH UNIVERSITY OF SCIENCE
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How to calculate real estate accessibility

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Accessibility of real estate

- Attribute determining the possibility of reaching certain destination
 - driving one's own means of locomotion
 - using public transport



Movement with own locomotion means

- Journey along the road network from real estate directly to some sort of central point, around which concentrates the life of inhabitants
- Two factors
 - “distance” of real estate from a central point
 - quality of the route that this access takes place



Getting to the center using public transport

- First, one needs to reach on foot to the selected station
- Only from there one can leave using means of mass transport



Data models

- Vector
 - lines (edges) – center lines of streets
 - points (nodes) – street crossings
 - line attributes
 - information about one-way and impassable streets
 - cost of travel along individual segments of the network (length or time)
- Raster
 - pixels
 - pixel value is the impedance that must be overcome to get to the next pixel (only time)



Used functions

- Service Area - finds the set of all lines (or polygon covering these lines), forming paths beginning at a center point, where total impedance measured from the center point along every individual path will be no larger than a given value
- Cost Distance - for each pixel determines the accumulated cost of reaching the nearest center

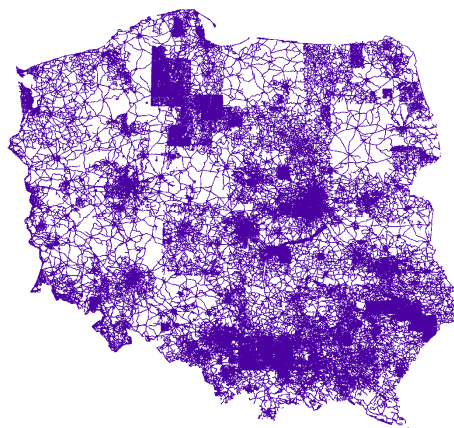


OpenStreetMap

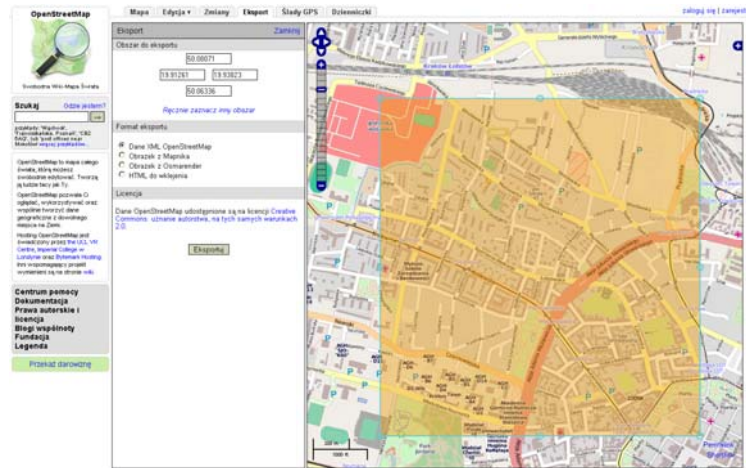
- Community project aimed at creating editable and available without restriction map of the world
- Created based on data from handheld GPS receivers, aerial photographs and other available data sources, as well as sketches made in the field
- Built by volunteers, so no plans are formulated for its systematic development
- Lack of central data quality control



Polish roads and streets in OpenStreetMap



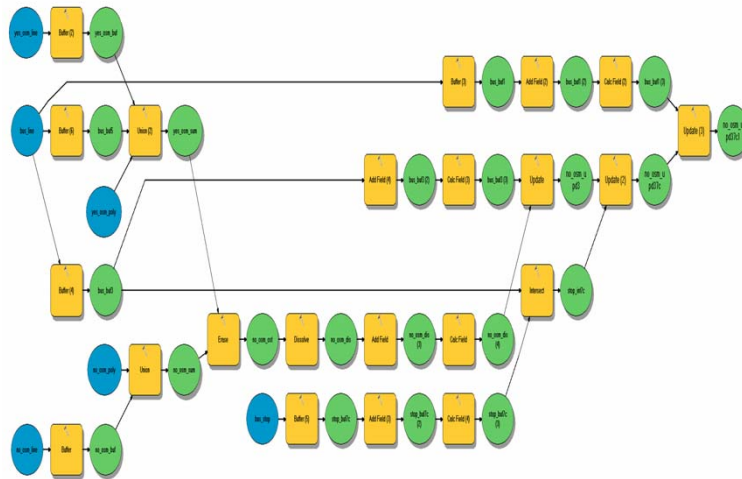
OpenStreetMap window in web browser



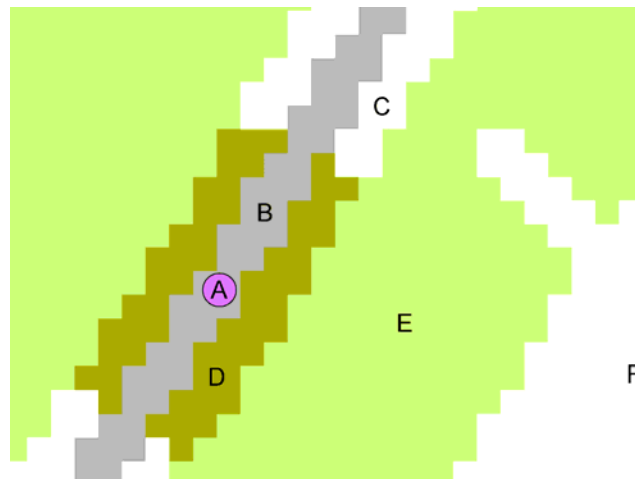
Data preparation

- For vector data Spatialite DBMS was used
- Both the road network, areas where pedestrian traffic is possible, and wait time at stops were modeled using the raster data

Model used for raster preparation

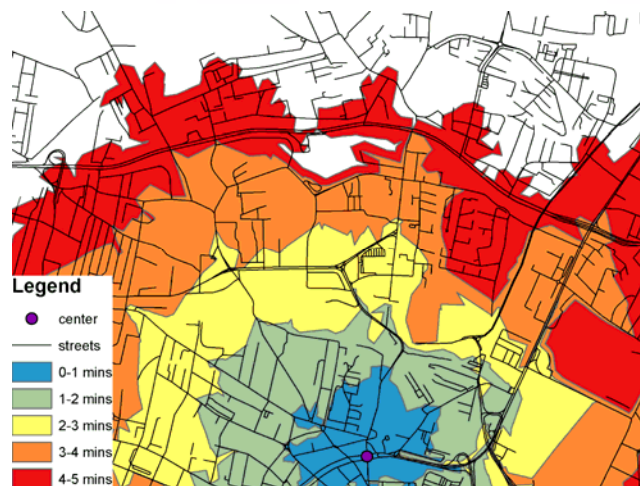


Enlarged detail



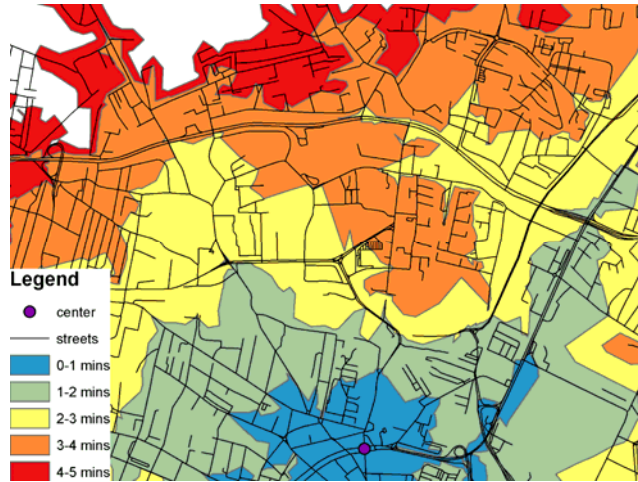
Results of conducted analysis

Service areas (the same speed)

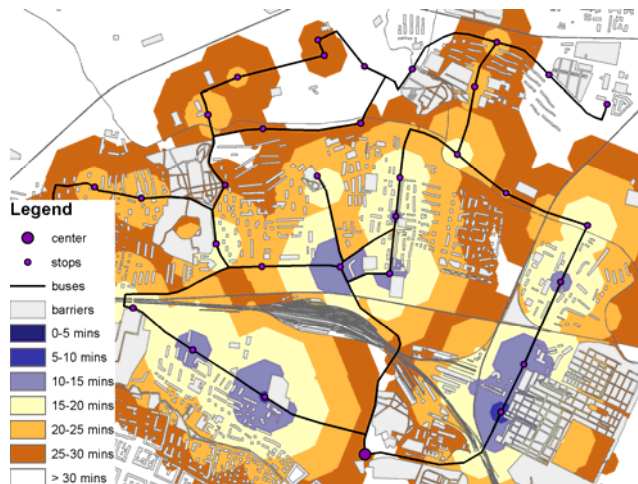




Service areas (different speeds)



Result of raster based analysis

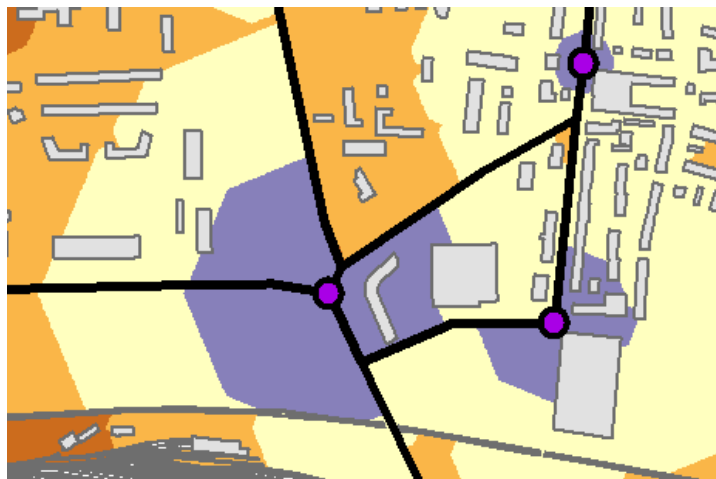




Enlarged part of the result (1)



Enlarged part of the result (2)





Conclusions (1)

- Network analysis performed on the vector data show the importance of proper attribute values describing the movement cost
- Analysis based on raster data provide better opportunities for mapping various aspects of real estate availability
- Resulting raster files, after the appropriate classification of the pixel values, must eventually be converted into a vector
- Detailed analysis of the results obtained from raster analysis showed certain imperfections of Kraków's transport network



Conclusions (2)

- Stops to be analyzed should be placed at street crossings
- Many potential barriers to pedestrians outside the streets actually does not affect the result of the analysis
- Elongated objects such as railway tracks or rivers, which have relatively few passages, proved to be very important
- The problem of communication lines forming loops was recognized
- OpenStreetMap can be recommended as an appropriate source of spatial data, particularly for network analysis