FlowMapper (v0.2) Plugin for Quantum GIS

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"Geographical movement is critically important. This is because much change in the world is due to geographical movement. Movement of people, ideas, money, energy or materiel"

Waldo R. Tobler

Main intention for developing this plugin is that there is no handy tool for depicting spatial interaction data (e.g. movement mapping, flow mapping) under GIS, especially in free/libre open source software domain.

Considering the development efforts that have been made in the last few decades to discover the full potential of GIS in every aspect, it is surprising to find this subject underdeveloped.

Constructing straight flow line segments between discreet nodes yield the simplest forms of spatial interaction maps.

As for the current release of FlowMapper (v0.2) plugin

> **(i) can generate node2node flow lines in popular shapefile format via "FlowMapper" tab based on an interaction matrix and a set of node coordinates,**
> **(ii) can calculate basic statistics based on the magnitude field of provided flow layer and perform filtering with respect to defined threshold via "Filtering" tab.**

---IMPORTANT!---
This plugin requires Python 2.6 and OGR/GDAL to run properly. Instructions for installing Python, GDAL/OGR and bindings can be found at http://ucsb.pbworks.com/Using-GDAL-with-Python (Thanks to A. Glennon, 2009)
---IMPORTANT!---

Plugin needs two inputs: (i) text file storing node coordinates and (ii) text file storing interaction matrix (a.k.a. flow data matrix)

In the first text file, each row corresponds for one node and it should contain one pair of coordinates (x, y) delimited by white space. (Decimal separator for coordinates is point ".")

In the second file, magnitudes of flows from the first node to last are given respectively. Resulting text file stores a square interaction matrix whose values are white space delimited. Each row corresponds to a "from" node and each column corresponds to a "to" node. The order of magnitudes listed in this text file should conform to the order that is used in the first file. (e.g. with reference to Figure 1 given in next page; number of outgoing bank interacts from node 4 to 6 is 177, vice versa number of outgoing interacts from node 6 to 4 is 186. Notice that matrix is not symmetric.)

Three types of flow lines can be generated by using this plugin: (i) two way, (ii) gross, (iii) net. When two ways option is selected, both incoming and outgoing flow lines are generated. When gross option is selected summation of interactions between a node pair is considered.

On the contrary, when net is selected, absolute difference of interactions between a node pair is considered.

Two sample datasets are supplied under the "test_data" folder. First one is a relatively small dataset that contains 12 nodes and a 144 element square matrix. Second dataset is a medium sized one containing 81 nodes and a square matrix with 6561 elements. Both datasets are tested and found to be working with FlowMapper v0.1.1 & QGIS v1.7.

First dataset includes total number of interactions between banks between 12 cities in the USA.
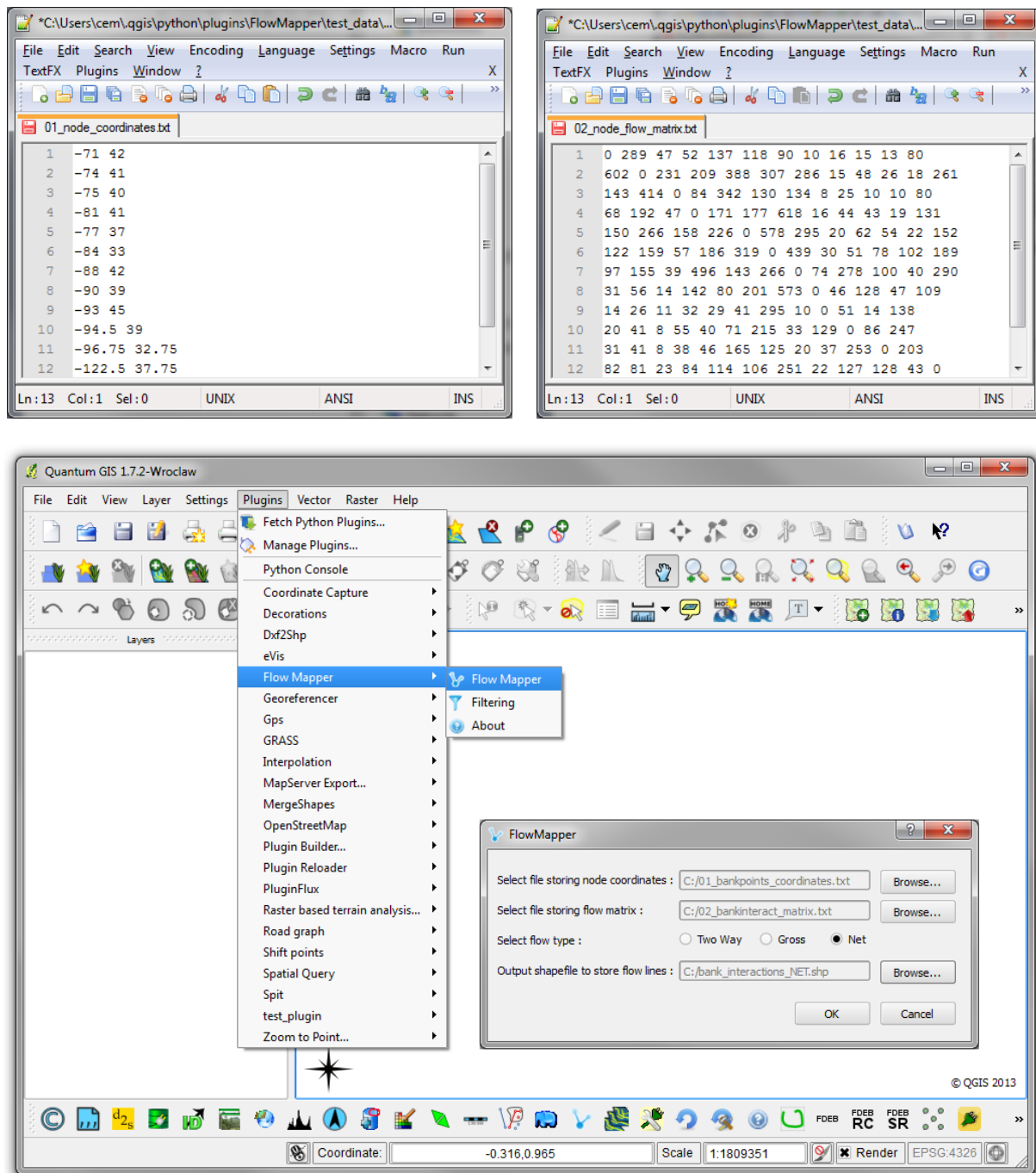

Figure 1. Text file storing coordinates of cities (upper left), text file storing square flow matrix showing number of bank interacts between cities (upper right), FlowMapper plugin (bottom)
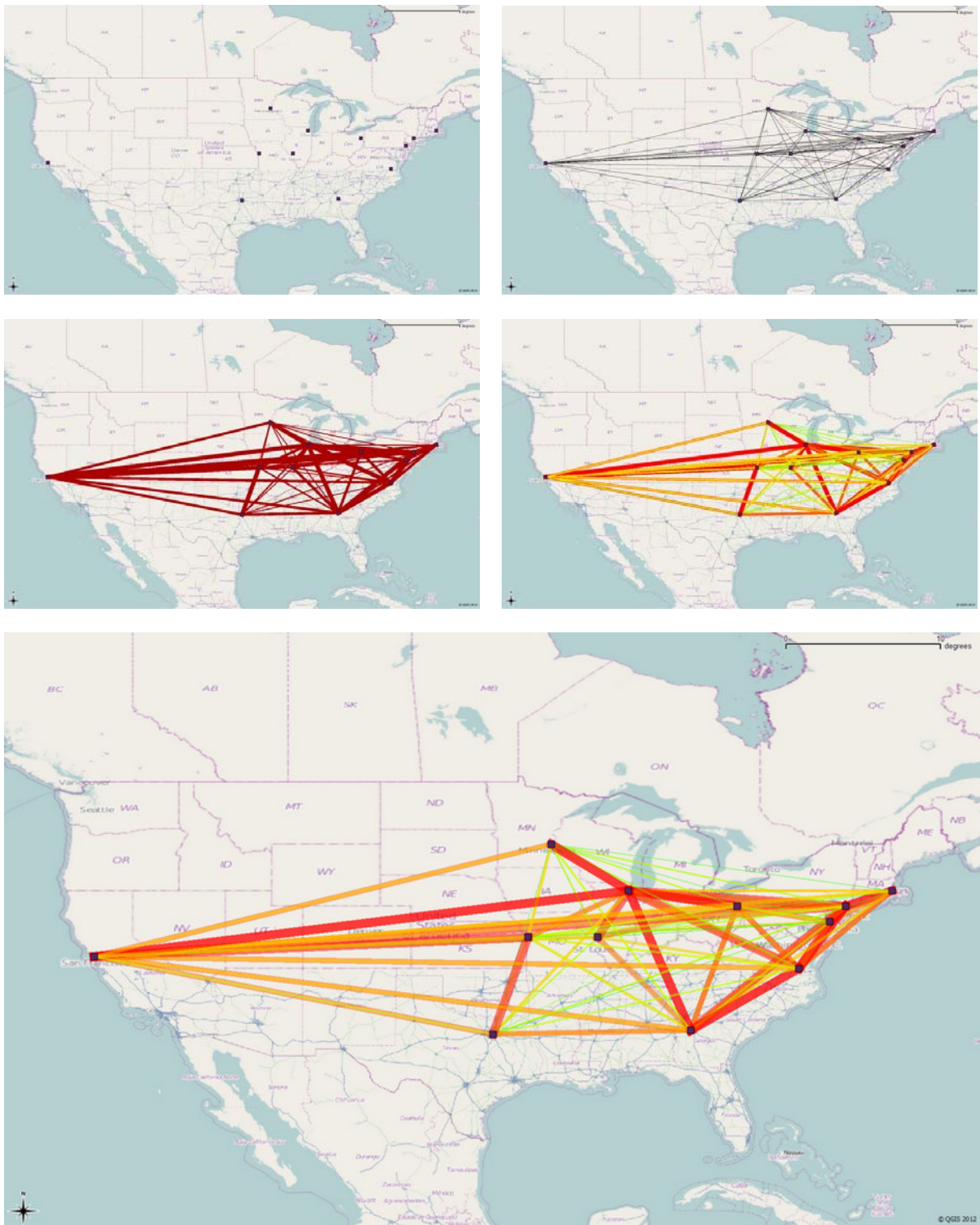
Figure 2. Location of cities (upper left), generated flow lines (upper right), flow lines with widths proportional to magnitude (middle left), flow lines with widths and graduated colors proportional to magnitude (middle right), semitransparent flow lines with widths proportional to magnitude (bottom)

Second test dataset includes;
(i) coordinates of 81 cities in Turkey (01_city_center_coordinates.txt) and
(ii) a square matrix storing the amount of inner migration between cities in one year period
2010 – 2011 (02_migration_matrix_between_city_centers.txt).
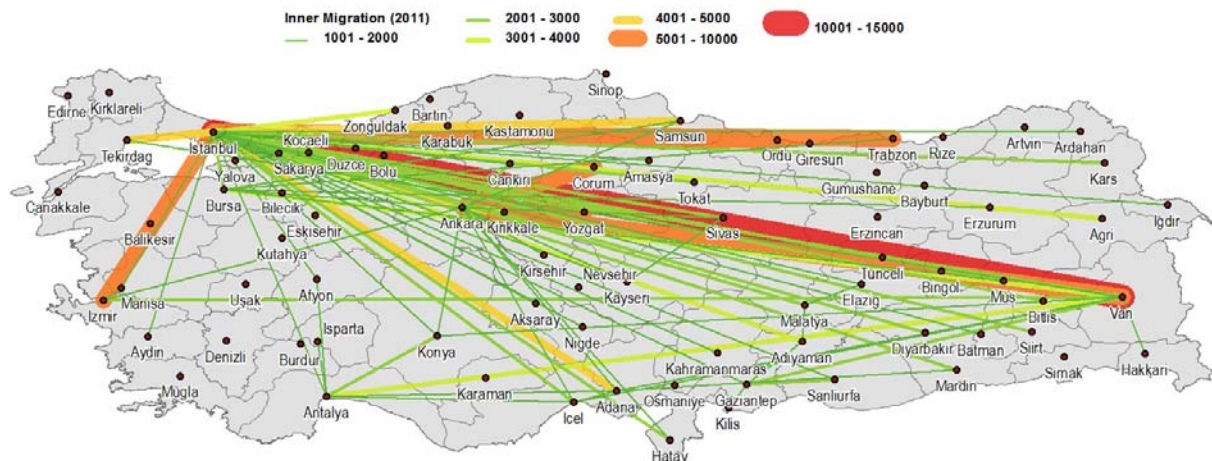
Figure 3. Flow map of inter city (net) migration in Turkey between years 2010 – 2011. (Flow lines depicting migrations less than 1000 people are ignored)

What is new in v0.2

Many bugs fixed. No more error message when exiting without from FlowMapper tab.

Created or filtered shapefile is automatically added into layer list and displayed.

Statistics and filtering tab is added

About dialog is added

Known Bugs in v0.2

Only tested to work successfully under Windows (both 32bit & 64bit).

Long file paths may encounter some problems. So rather keep them short (e.g. \\some_directory\node_coord.txt)

Trying to execute forms without selecting input and output files gives long error messages. More understandable error message or reminder would be nice.

Overwriting to a shapefile that is already added in the QGIS layer list; QGIS may crash and close.

Whats next?

I will try to fix bugs.

I will add KML/KMZ export capability from the generated shapefile containing flow lines.

Implement some node clustering, node adjustment algorithms for reducing visual clutter problem usually encountered in flow mapping. (Any help is valuable for this)