GEOM90007 A3 Major Project Design Report

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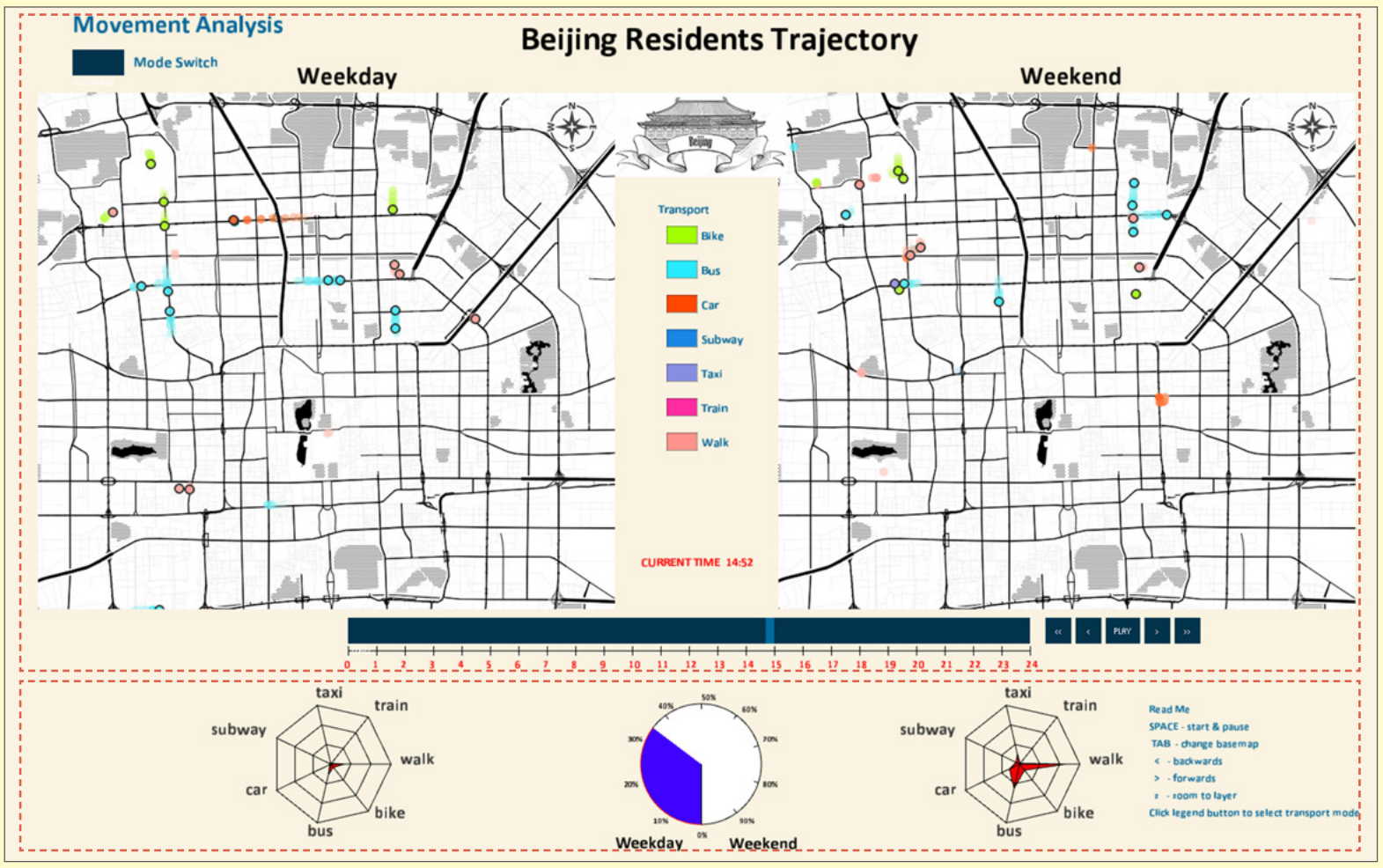
Data Pre-processing

R was used in data pre-processing to combine the transport mode data with trajectory data and reduce the recorded points from every second to every 20 seconds. Only the data within studied area in Beijing were selected and the time zone was converted to Beijing time zone. The data were sorted into two types, trajectories on weekdays and weekends respectively and sampling in Excel. In sampling, we ensured that the final output of trajectories on weekdays and weekends has the similar number of trajectories. Then, we converted the output csv files into geojson through QGIS for interface in Processing.

Movement Analysis



1. Mapping Section

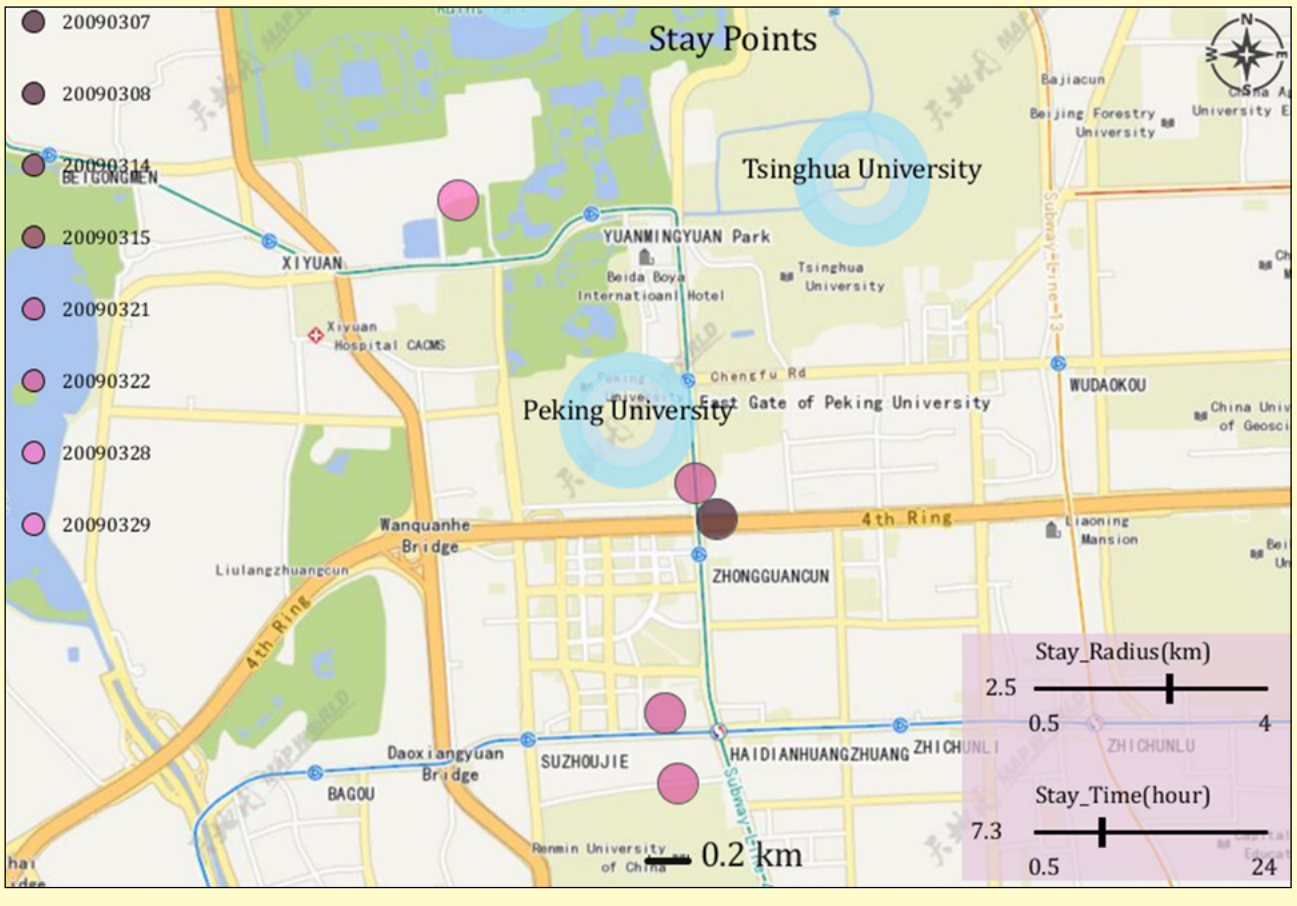
Our interface contains two maps, with one showing movements on weekdays and another on weekends. We have achieved almost all functions of a digital map. These functions include dragging, zooming in, zooming out, changing the base map and setting the visibility for each transport mode with different color, which can be selected on the transport legend. This will be easy to analyse sustainable transport and private transport separately. The time slider under maps is used to indicate the data time, which comes with various functions, including play and pause, drag to any time we want to observe, speed up and speed down up to three times of the default speed and backward and forward every 15 minutes. The five buttons next to the slider help us to achieve these functions easily or could just use the shortcuts shown in Read Me. We used dot points to visualize the movement in a specific time phrase colored by transportation modes. Each point represents the position in a trajectory. The point with stroke means the current position of this trajectory while other without stroke means the previous position of the same trajectory. The longer tail this trajectory had, the higher speed it travelled with.

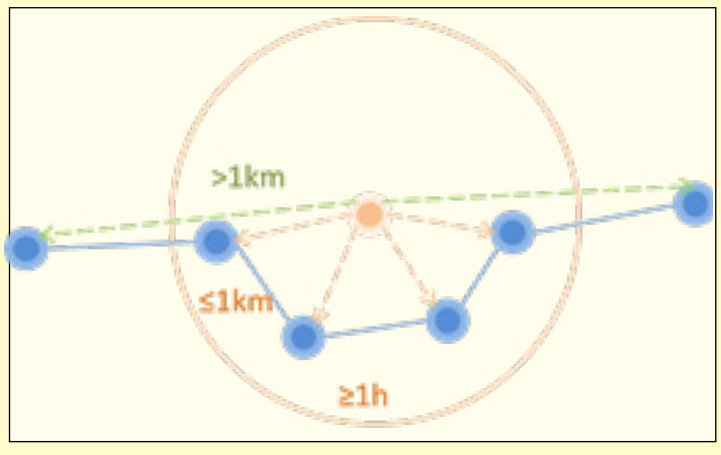
On the top left side, it is a mode switch button. Once we click the button. The stay point analysis window can pop out.

2. Charts Section

The star plot and pie chart are the visualization of the number of different transportation modes information. For the star plots, they separately show the proportion of seven kinds of transportation changing hourly on weekdays and weekends, which can directly reveal the transport preferences during a day. For the pie chart, it shows the proportion of trajectories on weekday and weekend at the same time with totally proportion setting to 100%. That can help user find the regularity of transportation on weekday and weekend, for instance, the rush hours vary on weekend and weekday.

Stay Points Analysis





A new window for drawing stay points will pop up when users press “q”. Users can manually define distance and time thresholds by dragging the pointers. For instance, if the distance threshold is 1 km and time threshold is 1 hour as the above figure, the stay point means that this person stayed in a circle with the radius at 1 km for at least 1 hour. This analysis generates all the stay points for all the trajectories collected on weekends in March 2009. The blue circles in figure 2 represent the clusters of stay points.

Sources: GeoLife GPS Trajectories in Microsof Research Asia; Unfolding maps