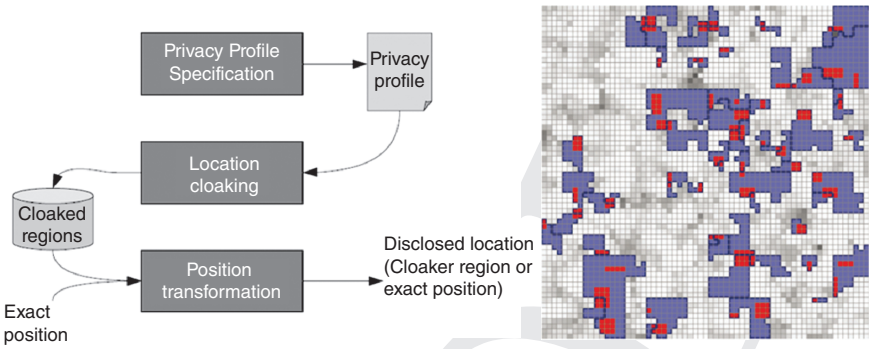
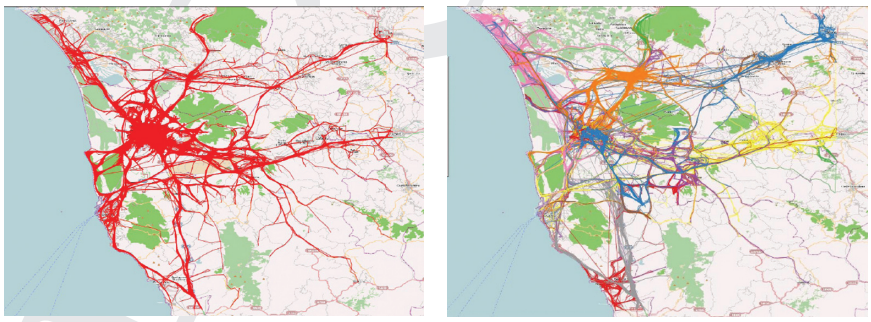


(a) (b)

Plate 2.9 The Probe system: (a) The workflow. (b) Obfuscated map: the blue polygons represent cloaked regions, the red rectangles sensitive places, the gray background the distribution of population in space.

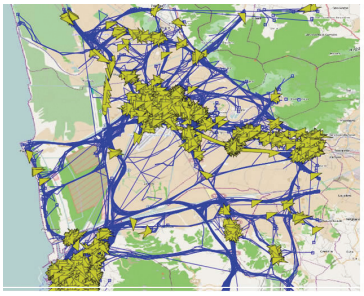
(a) (b) (c)

Plate 6.1 Visual representation of (a) a trajectory flock, (b) a sample result on a real data set with all trajectories involved, and (c) a zoom on the segments that form the flock.

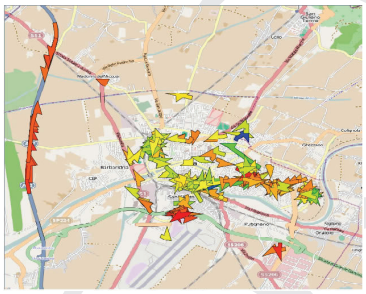


(a) (b)

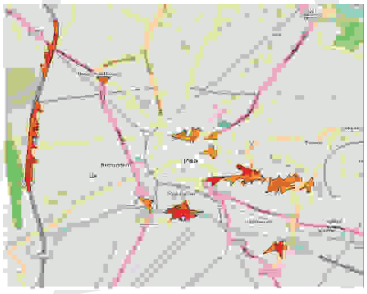
Plate 6.6 Sample trajectory clustering on a real data set of vehicles (GPS data collected by OctoTelematics S.p.A.), obtained using a density-based clustering schema and a spatial route distance function.



(a)

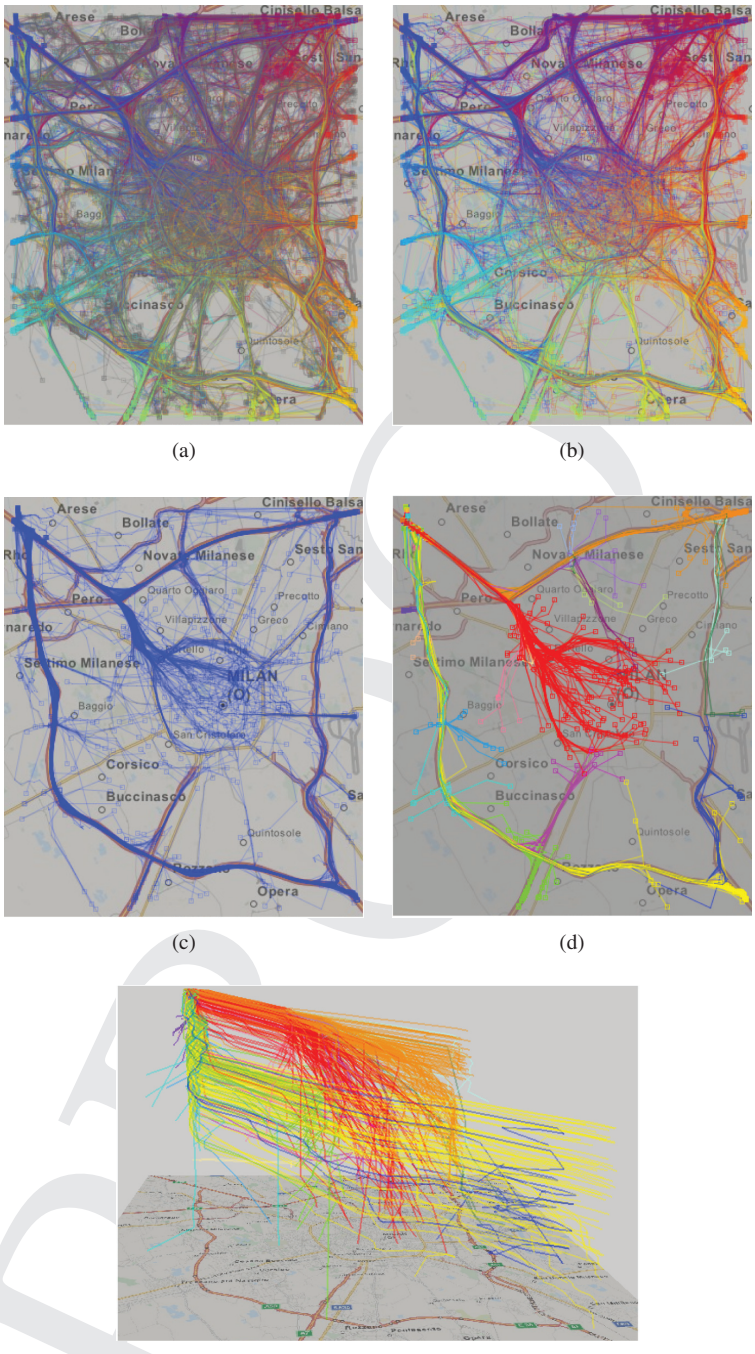


(b)



(c)

Plate 7.4 A graphical representation of the process of extracting traffic jams from the data. (a) Using the T-flock algorithm all the candidates are extracted. (b) The patterns are colored based on ratio between their speed and the free speed in the same area (Blue>1, Red<1). (c) The patterns with a speed lower than 1/4 of the free speed.



(a) (b) (c) (d) (e)

Plate 8.2 Interactive progressive clustering of trajectories. (a) The car trajectories have been clustered according to the destinations. (b) The noise is hidden. (c) One of the clusters is selected. (d) Clustering by route similarity has been applied to the selected cluster; the noise is hidden. (e) The clusters by route similarity are shown in an STC.

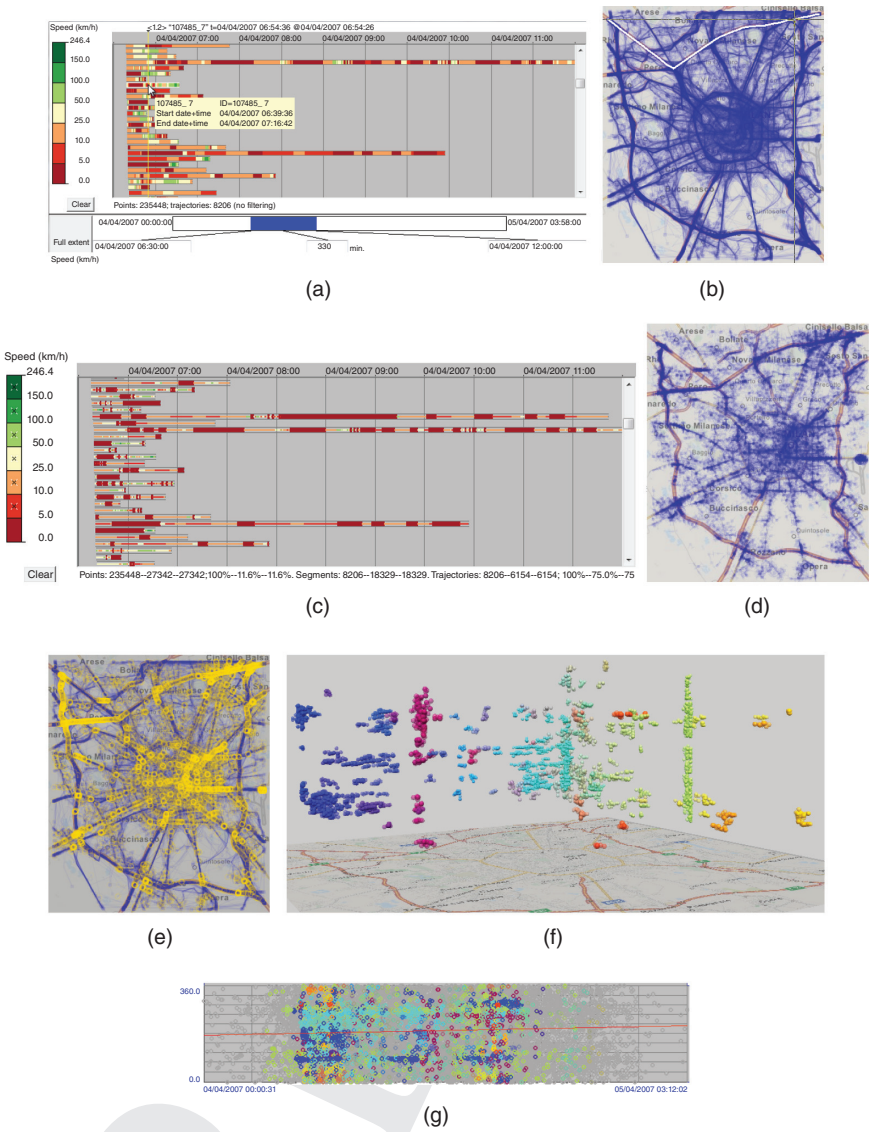


Plate 8.3 (a) A time bars display shows the speeds by color-coding. Mouse-pointing highlights the trajectory and marks the pointed position in a map (b). (c) Trajectory segments are filtered according to the speed values. (d) Only the segments satisfying the filter are visible on the map. (e) Low-speed events have been extracted from the trajectories according to the segment filter. (f) Density-based spatio-temporal clusters of the low speed events are shown in a space-time cube. (g) A scatterplot shows the times (horizontal dimension) and movement directions (vertical dimension) of the low-speed events.

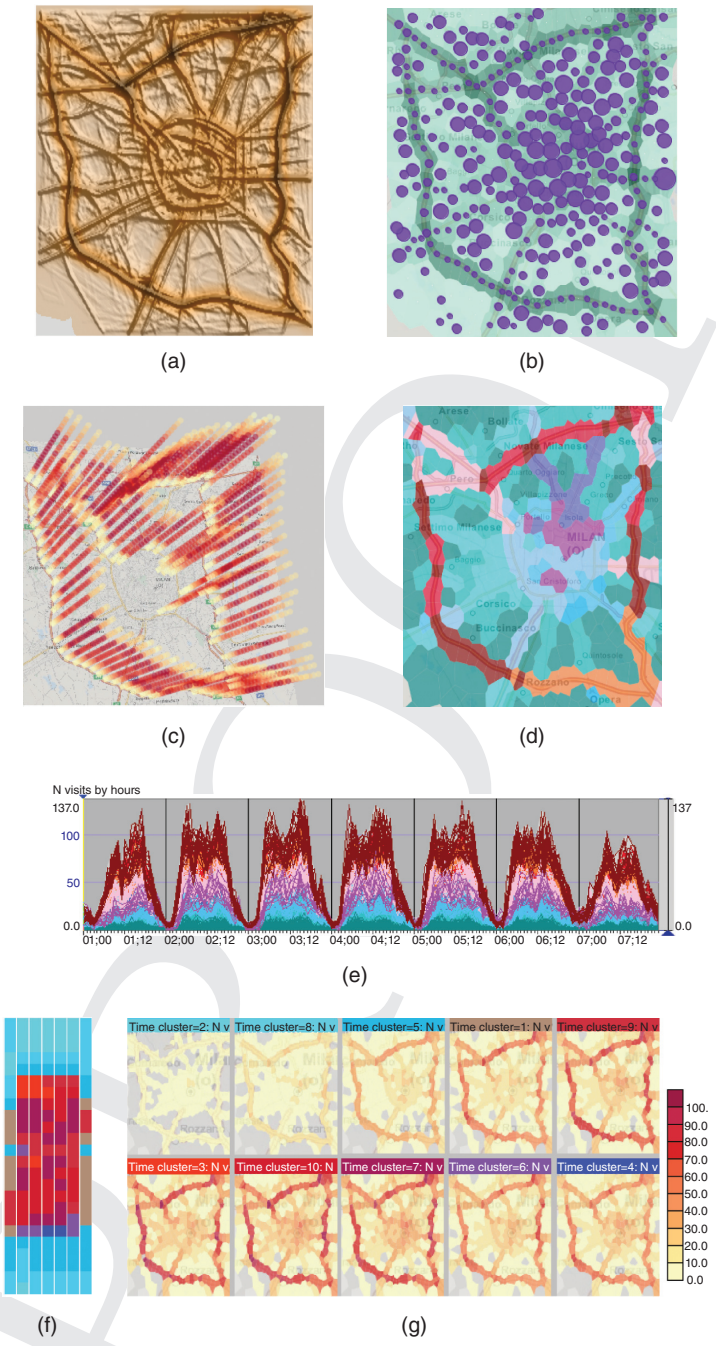


Plate 8.4 (a,b) Car tracks aggregated in a continuous density surface (a) and by discrete grid cells (b). (c) STC shows the variation of car presence over a day in the most visited cells. (d) The cells clustered by similarity of the presence time series shown on a time graph in (e). (f) Hourly time intervals clustered by similarity of the spatial distributions of car presence, which are summarized in (b).

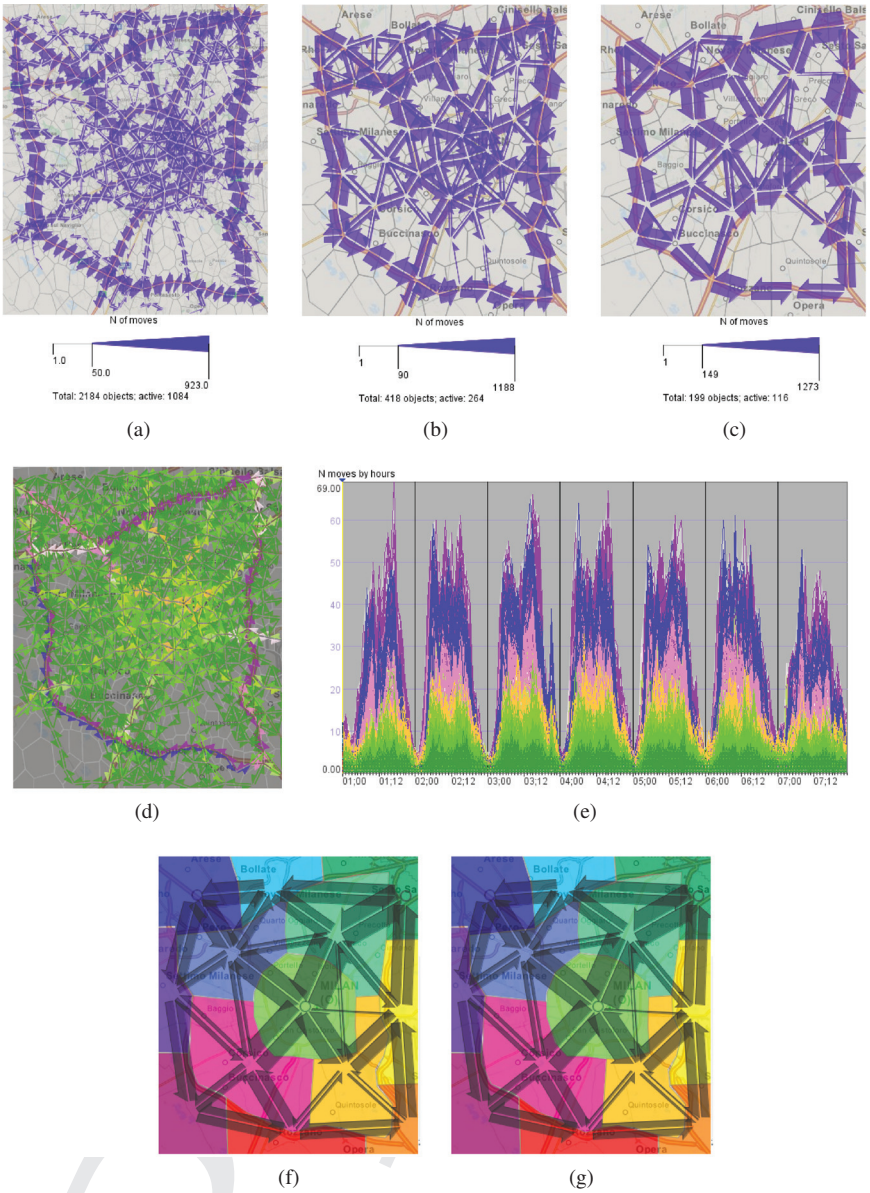
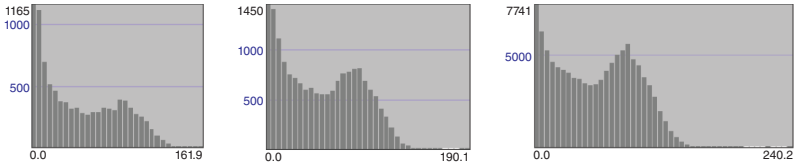
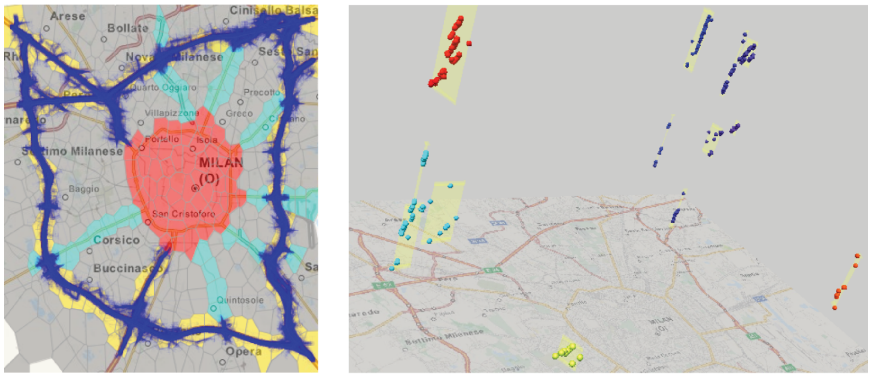


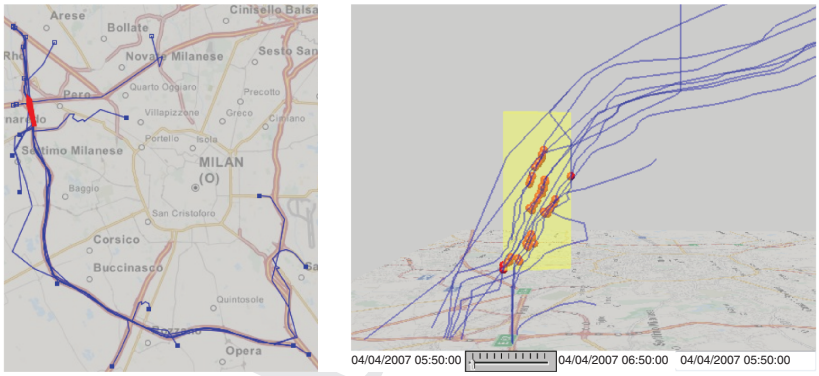
Plate 8.5 (a,b,c) Flow maps based on fine, medium, and coarse territory divisions obtained automatically. (d,e) Clustering of flows based on the time series of flow magnitudes. (f) Flows between predefined regions. (g) Investigation of movements between the regions over time adjusted to individual lifetimes of the trajectories.



(a) (b) (c)

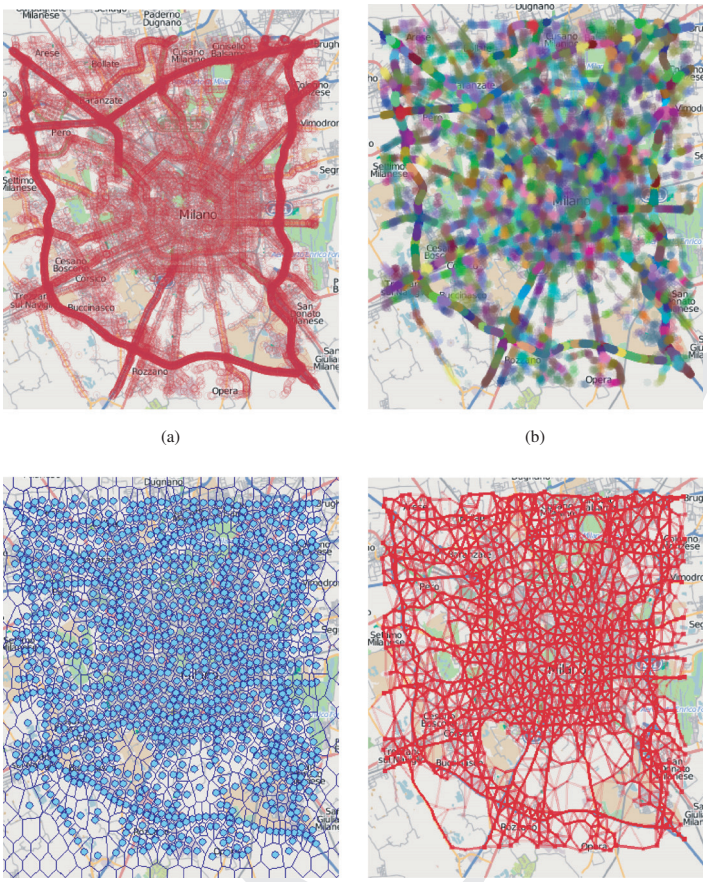


(d) (e)



(f) (g)

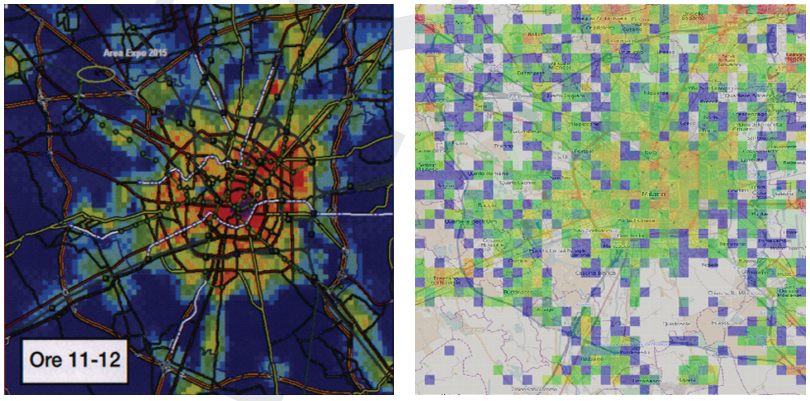
Plate 8.6 (a,b,c) Frequency distributions of car speeds on motorways in different ranges of distance to the nearest neighbor car: (a) below 20 m, (b) 20–50 m, (c) over 50 m. (d) Trajectory segments on or near motorways selected by means of segment filter. (e) Spatio-temporal clusters of low-speed events on motorways where the distance to the nearest neighbor is 10 m or less. Yellow shapes represent spatio-temporal convex hulls of the clusters. (f) Trajectories that passed through one of the convex hulls are selected by filtering. (g) The selected trajectories and respective low speed events in a STC.



(a) (b)

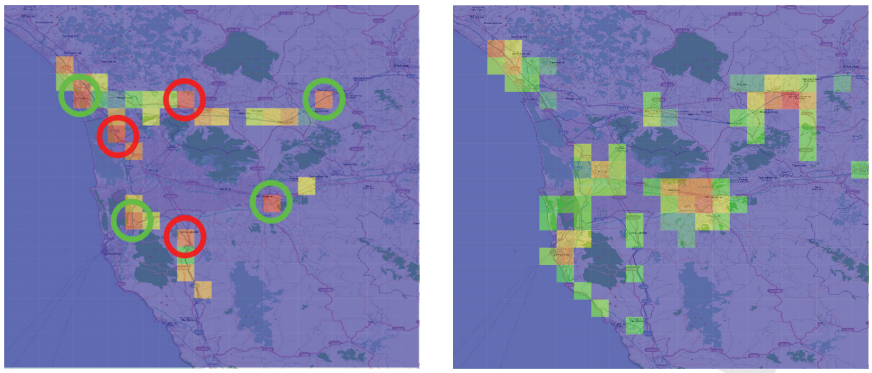
(c) (d)

Plate 9.5 Anonymization steps. (a) Characteristic points. (b) Spatial clusters. (c) Territory tessellation. (d) Generalized trajectories.



(a) (b)

Plate 10.2 Presence distribution between 11 A.M. and noon, (a) survey, (b) GPS data; frequent locations plotted with lighter shades.



(a) (b)

Plate 10.13 Distribution of presence: (a) with predicted trajectories, (b) with the real trajectories. As highlighted on (a), the predictor is able to correctly guess the most dense locations (green circles), though it introduces some false positives (red circles).

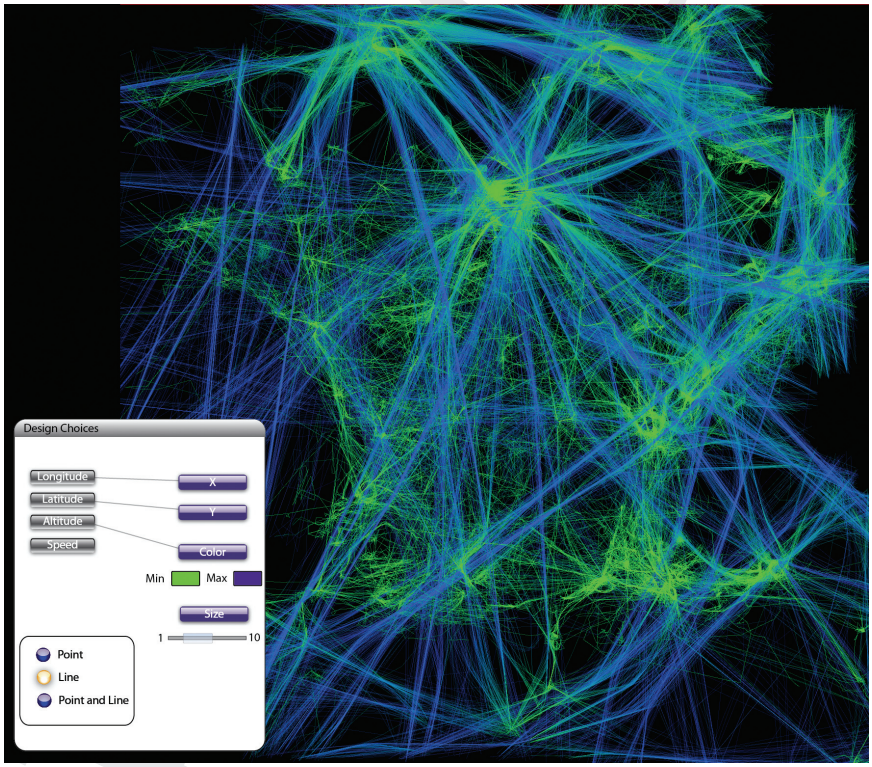
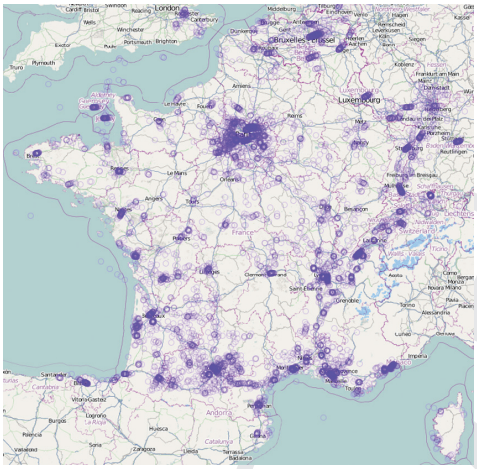
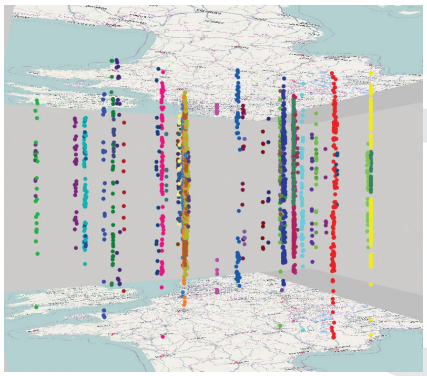


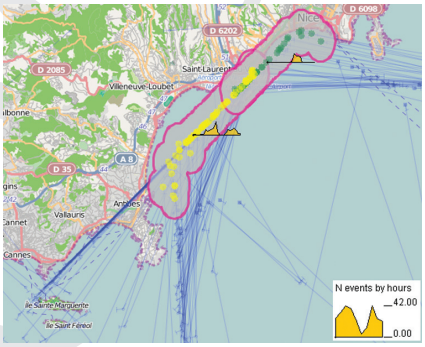
Plate 12.3 One day's record of traffic over France. The color gradient from green to blue represents the ascending altitude of aircraft (green being the lowest and blue the highest altitude). The French coastline is apparent here in terms of pleasure flights by light aircraft and the straight blue lines represent high altitude flight routes. A user interface shows the data set fields and the defined visual configuration.



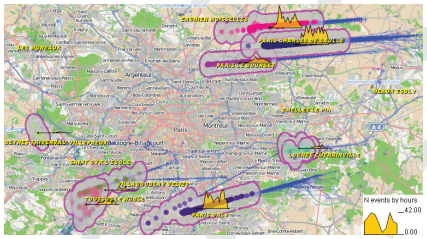
(a)



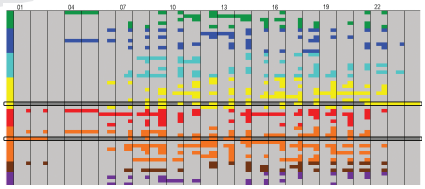
(b)



(c)



(d)



(e)

Plate 12.6 Event extraction results. (a) The positions of the landing events extracted from the flight data are drawn with 50% opacity. (b) The space-time cube shows the landing events clustered by spatial positions and directions. (c) The yellow and green dots represent two SD-clusters of landings in the airport of Nice. The time diagrams show the dynamics of the landings from two directions. (d) The time diagrams show the dynamics of landings in the airports of Paris. (e) The flight distribution between the airports by hourly intervals. Highlighted are rows for the connections Marseille–Paris (yellow) and Paris–Marseille (orange).