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Visualisation of Origins, Destinations and Flows with OD Maps

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We present a new technique for the visual exploration of origins (O) and destinations (D) arranged in geographic space. Previous attempts to map the flows between origins and destinations have suffered from problems of occlusion usually requiring some form of generalisation, such as aggregation or flow density estimation before they can be visualized. This can lead to loss of detail or the introduction of arbitrary artefacts in the visual representation. Here, we propose mapping OD vectors as cells rather than lines, comparable with the process of constructing OD matrices, but unlike the OD matrix, we preserve the spatial layout of all origin and destination locations by constructing a gridded two-level spatial treemap. The result is a set of spatially ordered small multiples upon which any arbitrary geographic data may be projected. Using a hash grid spatial data structure, we explore the characteristics of the technique through a software prototype that allows interactive query and visualisation of 10^5–10^6 simulated and recorded OD vectors. The technique is illustrated using US county to county migration and commuting statistics.

Keywords: visualisation, geovisualisation, OD map, OD matrix, treemap, flow, trajectory, migration