# Uses of Lattice Space-Time Field in Irregular Transportation Network Constraint Space

**Huatao-Sun, Zhangcai-yin, Qingquan-Liu**

Both space and time can be measured and counted, and this character makes space-time be a kind of resource. For taking use of this resource, researchers found two algorithms—space-time path and space-time prism to calculate and statistic individual's activity visually.

In the early phase, space-time path takes individual's activity space as its two-dimensional surface and take time axis as the third dimension. In this coordinate system, we can use polygonal lines to show the trace of individual's activity. Both space-time path and space-time prism are two important algorithms of classical time geography, but they all have one weakness—assume of uniform velocity. In fact, people's action is limited by kinds of traditional conditions, this assume is definitely not rational, so algorithms based-on this assume are also unreality. New methods and theories are mentioned to enrich time geography. Lattice space-time field raised by Miller resolves this question in a way. In this experiment, we will take part area of WuHan for example to study uses of lattice space-time field in irregular transportation network constraint space.

At the start of the experiment, we need to handle the data. Taking the remote sensing image of WUHAN University of Technology and the area around it as the source data, and after some pretreatments (like geometric correction etc.), we can vectorize the image and then get the irregular transportation network constraint space (Figure 1). When data is ready, extract accessible domain from the prism built based on traditional space-time prism theory firstly, and then we will implement analysis based on lattice space-time field (Figure 2). Main data structures referred to in the process include: regular lattice network, lattice with shortest time which calculated by speed and length of the road as its unique attribute, neighborhood network with time weight (Figure 3). Then we can calculate the accessible domain according to the neighborhood. Adjust the influencing factors and repeat the experience. According to the results, study the relationship between accessible domain and the factors, and then establish the error function.

When the experiment finishes, we will not only get error function between accessible domain calculated by lattice space-time field and its influencing factors but the best accessible domain calculated by lattice space-time field.

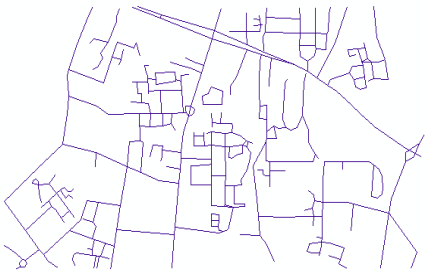


**Figure 1.** irregular transportation network constraint space

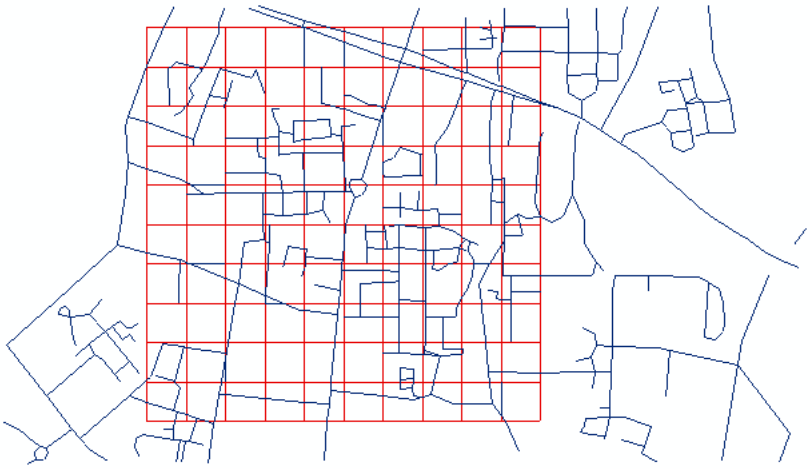
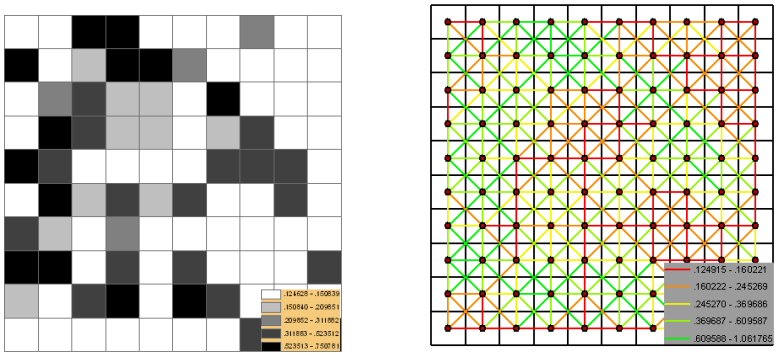


**Figure 2.** regular lattice net and transportation network




(a) (b)

**Figure 3.** (a) lattice network with time attribute (b) 8-neighborhood with time attribute

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