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Spatial-Temporal Modeling of Linguistic Regions with combined Indeterminate and Crisp Boundaries

Language Geography – a branch of classical Human Geography (Delgado de Carvalho 1962) – is used to enhance the usability of digital language and dialect databases. From a spatial-temporal viewpoint mainly static linguistic phenomena are mapped, which result in dialect regions or certain isoglosses. In this abstract, the spatial-temporal processes of language and the implications on their representation as geographical objects in the computer are highlighted.

Due to the fact that language and dialect are no static phenomena per se, a representation in the computer should be able to model this fact. Hence, we apply the theory from fuzzy sets (Zadeh 1995) and indeterminate boundaries to Language Geography. Given the fact that language regions and isoglosses may move over time, boundaries between adjacent regions are not always crisp – but they can be crisp if a natural barrier hinders the movement of people. This is true for e.g. mountain chains or oceans, which constrain the movement of people.

In addition, language islands and regions arise from scratch and existing language regions or islands disappear over time – which has to be modeled accordingly. Globalization and urbanization fosters the creation of new language islands and regions within existing language regions. Hence, the regions have no crisp border, but share a certain part of space with fuzzy memberships of the involved linguistic regions (Burrough 1996, Worboys 1998).

The article covers the spatial-temporal modeling of language phenomena based on fuzzy sets, indeterminate boundaries and spatial-temporal change of spatial entities (Medak 1999, Hornsby and Egenhofer 1997, Hornsby and Egenhofer 2000). Hence, linguistic processes are analyzed regarding the implications on their according spatial-temporal entities and processes.

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