

Designing an Ontology of Social Place

Alessia Calafiore

University of Torino, via Pessinetto, 16, 10125, Torino
University of Luxembourg, 6, rue Richard Coudenhove - Kalergi, Luxembourg
calafi@di.unito.it

Abstract. So far, the notion of place has been involved in many conceptual schemas, vocabularies and ontologies. Notably, the concept has been articulated in divergent ways mostly referred to a space-centered perspective of places. With the emergence of the so-called Volunteered Geographic Information (VGI) systems and geo-social media we are facing an expanding availability of spatio-temporal data. Data collected with these technologies is generally expression of the social function of space rather than to its physical characteristics. However, existing ontologies and conceptual schemas fail in recognizing the social and dynamic nature of places that could be retrieved from this relatively novel source of information. My research project aims at defining a formal representation of a notion of place which is not purely spatial but results from a human conceptualization of place in a social dimension.

Keywords: Ontology design, Powertype, Roles

1 Introduction

Traditional Geographic Information System (GIS) holds a spatial representation of the geographic world. It uses a spatial reference system, which allows to transform physical objects of the geographic world into geometrical abstractions in order to create cartographic representations. GIS has been largely used for urban design and planning. In recent years, Volunteered Geographic Information (VGI) systems [7] have significantly spread in order to collect geospatial information bottom up whose semantics reflect different perspectives of space uses [2]. To this respect, a purely spatial representation of the geographical world does not entail information related to the human point of views. The concern here is to model the reality which mostly matter in the everyday spatial experience of people. As a consequence, it is proposed a notion of place considered not only as a space or a location but as an entity ontologically dependent on human actions. Concepts of *space* and *place* [5] hold many differences and in modern geography have been defined as the opposite extremes of a continuum which goes from the ideal geometrical abstraction of *space*, simply identified by locations, to the experiential world of *place* dependent on people experiences of their living in spaces [4]. Following Tuan [15] *space becomes place as we get to know it better and endow it with social and cultural values*. It can be said that money, citizenship and

law are transparent social constructions because they obviously could not have existed without societies. Likewise *place*, or what it is called here *Social Place*, can be considered a social construction as well [12, 15]. The construction of the social reality, in Searle’s perspective [14], is related to some institutional facts that allow human minds to reach agreements on things meaning. Therefore, at this stage, some questions emerge: How is the place socially constructed? How ontologies can help filling the gap among machine representation of space and a social conceptualization of place [8]?

2 Social Place as Social Role

In Guarino and Welty [9] *food* is a role an entity may play in an eating event, likewise we say that a *beach* may play the role of being the *PlaceWhereSunbathing* during the day, but at night it may become the *PlaceWhereHavingParties*; furthermore, during the winter it can be classified as *Place WhereAdmiringLandscape*. Thus, we can say that a *beach* may play different place roles depending on an action event. Role characteristics, indeed, fit with our definition of place. Notably, it is: **anti-rigid** since a place existence is temporally defined by the action duration; therefore, a space can play or not a place-role; **dynamic** since a space can play different roles simultaneously (i.e. a park can be at the same time the place where running or the place where having a picnic), or different space entities can play the same role, for example beaches or swimming pools as place where sunbathing. Additionally, places might be defined as a social construction insofar they are considered as an **immaterial product** of a community. As a consequence, to identify specifically the **social role** [13] a space may play we need to focus on the intentionality shared among a community of agents in performing an action. Thus, to design an ontology representing a social place it is not possible to have the concept of individual action but its *generalization* as social practice. In a broader sense, the concept of social role mirrors the notion of *status* by Searle [14], since its constitution reflects the Status function: *X counts as Y in context C*, where *X* is an entity, *Y* is the status and *C* the context, where the latter fixes the constitutive rules for defining the status. In this case, the constitutive rule to define a social place is expressed by the emerging of social practices which depend on agents intentionality in performing a particular kind of action located in some space. Notably, the agents we-intention related to social practices is related to the social expectations which give a common recognition of the social function of place. Therefore, in our case we need to refer to social place as a social role which is anti-rigid, dynamic and emergent. Figure 1 shows the preliminary ontology of social place that has been designed. It is grounded in many DOLCE concepts and it makes use of the *isClassifiedBy* relation proposed in [10]. Classes in the ontology are:

- *Space*: specializes DOLCE physical endurant since it has a direct physical quality which is specifically spatial; it also locates actions.
- *Action*: as in DOLCE, it is an event with at least one agent participating in it.

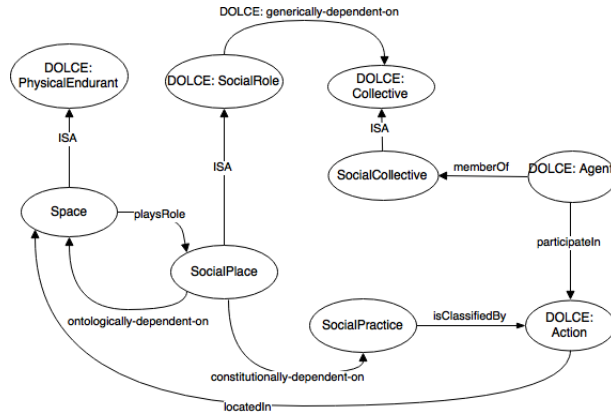


Fig. 1. From Space to Social Place. The figure shows a preliminary ontology of Social Place where ellipses are concepts and arrows the relations between concepts.

- *Agent*: a catch all class for all the agentive object; it is participant in some perdurant (notably here action).
- *Social Collective*: is a collective generally related to roles typical of the social world; they are based on sharing the same social practice so they are unified by having the same collective intentionality.
- *Social Practice*: is a powertype of the action types as described in the follow.
- *Social Place*: is a social role, thus as in DOLCE, it is generically dependent on some collective; in particular social place is characterized by other dependencies, on the one hand it is ontologically dependent on space existence, in a sense that without a spatial reference social place could not have existed and on the other it is constitutionally dependent on social practices since the identification of a classification relation between actions and social practices models the social emerging of social place as collectively recognized.

3 Powertype and the *isClassifiedBy* Relation

To *generalize* action in social practice it is used the notion of powertype. The most known use of powertype is related to biological species classification [11, 1, 10]. In these cases it is generally recognized the problem of treating species as concrete entities existing in time and space in order to explain their biological evolution or changes in their typical habitat [10]. Likewise, here the intention is to consider social practices not simply as actions but on the one hand as related to existing subkinds of actions and on the other hand as characterized by their own properties and dynamics of change. For instance, the action of running can be subtyped on the basis of agents intention such as the *agonisticRunning* whose agent wants to compete or the *runningAsHobby*; in this example, the *agonisticRunning* and the *runningAsHobby* are at the same time subkinds of

the *running* action and instances of the social practice class. To solve the plural nature of social practice as action subkind and as concrete entity with its own properties it is needed a multi-level approach using the notion of powertype. The two ontological dimensions of action and social practice are related by the *isClassifiedBy* relation, saying that each instance of social practice is classified by instances of action subkinds. However, this raises the issue of which kind of collective entity the powertype is as discussed in [10]. This approach is used here to refer to social practice as concrete entity, having specific property and temporal quality independently both from the number of instances of the related action subkind and from properties of action that are not inherited by its powertype. As suggested in [10] the Fine's theory of variable embodiment [6] reflects this non-classical mereology. For Fine, a variable embodiment is an individual f that at each world w picks up a particular rigid embodiment according to a given principle F (the rigid embodiment is in this case termed the manifestation of f at w). In this case, an individual of socialPractice at each world w embodied the actions that are unified by a specific principle (F). This unity principle is the same of what Fine calls the form of the whole. Notably, a number of individuals $x1...xn$ standing on a relation R form a Rigid Embodiment (symbolized as $x1...xn/R$). Thus, there is a number of action instances ($x1...xn$) standing in the relation between agents performing the actions and their being member of the same social collective. Furthermore, social practice and consequently social place need to be characterized by temporal quality. Therefore, in future works, it will be introduced a temporal entity called *socialTime* to represent when a particular action subkind happens more frequently.

4 Conclusions and Future Works

In this paper it is presented a new perspective in the conceptualization of space as social place. In recent years, the increasing of applications aimed at collecting geographical information on a volunteered basis pushes toward a re-definition on the notion of place. Notably, these systems, also known under the umbrella term of Volunteered Geographic Information (VGI), allow users to express their point of view about the place they live in. However, this social characterization is not modeled in existing ontologies. As a consequence, the research objective is to create a model enabling the representation of places social knowledge and its dynamics. Our work will enable a use of crowdsourced information about places without losing its peculiar social facet, opening up new opportunities for geo-spatial decision support systems [3]. Identifying the social and experiential functions related to places is a crucial task in geo-design and it is now achieved through both qualitative and quantitative methods with a low level of automatism. Notably, managing this kind of social knowledge currently rests almost exclusively on the shoulders of individual planners. Also, VGI are becoming more and more similar to social media where users can interact more with each others. This will help a better understanding of collective behavior. The classification of spatial region as social place has been modeled in order to au-

tomatically differentiate places on the basis of their collective uses. Translating this in a participatory planning process it will be the stage when stakeholders would be recognized. The notion of stakeholder here is intended in a broader sense as related to the intentionality of a collective. The main objective is to be able to distinguish places on the basis of which social collective is performing a social practice in order to characterize in much more detail the social identity of places. So far, we created a preliminary ontology as shown above. Future works will be focused on the modeling of *collective intentionality* and *social time*. Collective intentionality is not clearly formalized in existing ontologies. In particular, we will need to define relations between individual intentions and collective intentionality; also, how the collective intentionality is shared among members of social collectives will be object of further analysis. With respect to the concept of social time our work will be aimed at formalizing action recurrence to allow the characterization of social practice in relation to time.

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