Using GIS to Enhance Historic Preservation: From Mapping Building Construction Dates to Mapping Cultural Relationships

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Introduction

Since the early 2000s, the National Register of Historic Places (NRHP) has increasingly relied upon GIS technologies to assist in the documentation, preservation, and managing of historic sites. The NRHP's criteria for historic preservation are focused on the site's historic significance and integrity. On the one hand, sites must be at least fifty years old, associated with historic events or persons, and have certain cultural qualities. At the same time, site evaluation must take into account "an understanding of a property's physical features and how they relate to its significance" (NRHP, 1997).

In fall 2018, I partnered with CSU's urban geography class and two community organizations, Historic Columbus and MidTown Inc. to produce a thematic map to aid in the nomination of the Carver Heights subdivision to the NRHP. Carver Heights, founded in 1950, was the first postwar African American segregated subdivision built in Columbus, Georgia. The map revealed the subdivision's original extent and three major periods of growth from the late 1940s to 1962 (Rees, 2018).

My work led me to the question, how has GIS actually been used in the field of historic preservation and what additional perspectives and strategies I might be able to bring to this project?

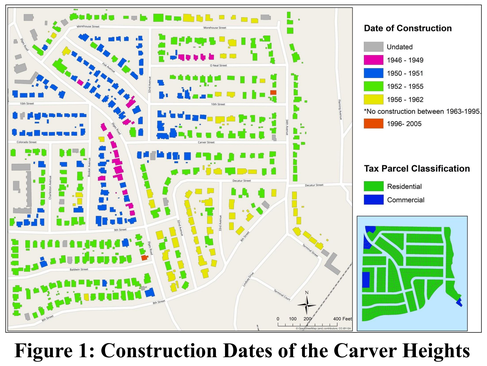

Figure 1: Construction Dates of the Carver Heights subdivision

Figure 2: Overall building scores at Ft. Ord

Three Uses of GIS within Historic Preservation	Fort Ord: Modeling Historic Structure Candidacy	Uzbekistan: Preserving three UNESCO Historic City Centers	Carver Heights Subdivision: Documenting Historicity for the NRHP
Goal of Project	Prioritize preservation of historic structures at former U.S. army base using GIS site selection model.	Preservation of 3 cities' urban fabric, traditions and customs by documenting integrity and authenticity of historic structures and developing management plans.	Potential nomination of subdivision (residences and commercial structures) for preservation under NRHP.
Relational Analysis	Correlating set of five building qualities- age, condition, state of modification, function, and presence of artwork (internal to the building) - against set of spatial attributes - elevational prominence, accessibility and uniqueness.	Combining textual, photographic and cartographic information of traditional residences and surroundings with socioeconomic data to prioritize preservation efforts.	Situating buildings' age and functionality within the subdivision's spatial context through distribution of buildings and the area of the subdivision.
Spatial Analysis	Buildings containing highest scores of desired traits showed patterns of clustering that marked ideal historic districts.	Showed changes in value and condition of residences over time and revealed buildings of high heritage value in poor condition.	Marked spatial & temporal patterns, revealing the spatial functionality of the community and charting its growth from founding to peak.
Visualization	Identified historic sites, their spatial patterns and subsequent likelihood for preservation in line with a priori assessments.	Thematic maps promoted awareness in local communities, instigated policy changes in the Uzbek government, & suggested modifications to heritage boundaries.	Illustrated historicity of site, published in state historic preservation newsletter, and to be included on interpretive panels located in the community.

Table 1: Comparing Gregory and Ell's three uses of GIS within historic preservation with three case studies.

Methodology

Gregory and Ell (2007) specify three main benefits of GIS to historic preservation: the relational analysis of spatial and nonspatial data, the spatial analysis of patterns based on datasets and location, and the visualization of data graphically through thematic maps. This poster will identify these benefits in three case studies: the Carver Heights project, the modeling of historic structure candidacy at the decommissioned Fort Ord in California and the preservation of the historic landscapes of three World Heritage cities in Uzbekistan (Musser, 2016; Vileikis et al., 2017). Using the lens of space syntax theory, an urban morphological approach that quantifies the relationship between social ideas and the built environment (Hillier and Vaughan, 2007; Turner, 2004), I analyze the ways in which these projects utilized GIS, see what, if any, gaps exist in their methodology and, ultimately, encourage more impactful outcomes for future efforts.

Findings

As Table 1 indicates, all three case studies offer a quantification of the historical and cultural elements of each heritage site at three scales (multi-city, city district, and neighborhood). Echoing Gregory and Ell's (2007) articulation of the three benefits of GIS to historic preservation, these case studies demonstrate the use of GIS in combining the analysis of spatial and historical data, the analysis of site patterns, and the visualization of this information in a way that engages a wider audience. However, these analyses did not reach their full potential. The spatial analysis tools of ArcGIS, the principle GIS software utilized by these projects, are limited by their reliance on metric statistical techniques that elide the ways in which humans perceive and interact with these sites according to space syntax theory (Hillier and Vaughan, 2007). As such, they are more suited to describing geographic patterns than exploring the social and historical processes behind their formation.

While the model run at Fort Ord was ultimately successful in identifying historically significant structures, the model creators noted that two of the statistical techniques used for their relational analysis - the prominence and accessibility measurements - were not capable of capturing the

Figure 4: Historic center of Bukhara with new heritage zones

Findings (continued)

topological and organizational factors that affect how humans actually perceive these structures (Musser 2016).

The novel approach of UNESCO and the Uzbekistan Board of Monuments was able to identify at-risk historic structures based on physical surveys and the thematic maps produced were influential in the development of preservation management plans. However, little attention was paid to the morphological influences on the socio-economic factors that directly impacted the survivability of these structures (Vileikis, O. et al., 2017.)

Finally, for my own map project, the spatial analysis of construction periods brought a depth of analysis that would not otherwise been utilized in describing the community. However, a deeper analysis of the relationship between the spatial functionality of Carver Heights and the racial tensions that influenced its design would help to illustrate the historical significance of the community in a more impactful manner (Rees, 2018).

Conclusions

While GIS has become a major tool in the historic preservation process, it can be enhanced by a deeper level of spatial analysis that supplements traditional empirical techniques with an understanding of the topological nature of the built environment. Space syntax quantifies the social element of space through the analysis of urban spatial configurations and their effect on human activity. This theory can be applied to spatial analysis via Depthmap, a tool that calculates how people interact with space by measuring locations according to visible space (Turner, 2004).

I propose that the application of space syntax theory in particular would allow historic preservationists to more fully integrate historical accounts of sites within their geographic context and understand spatial systems as producers of meaning.

References

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