VISUAL ANALYTICS FOR CULTURAL HERITAGE

STUDENTS / UNIVERSITIES

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Motivation

Visual analytics is a multi-disciplinary field of data science that aims an effective understanding and an analytical reasoning of datasets facilitated by visual interfaces. We combine visual analytics with history in this project and focus on the "Fall of Constantinople / Conquest of Istanbul" event in history. We propose a framework to reflect the uncertainties of this historical event into a digital tool. Our framework contributes to the cultural heritage while creating a visual representation of a historical event by showing all the possible data that has been collected from historical records.

Uncertainty of Data

Possible uncertainties in spatial and temporal data, which can arise from the documentation of the approximately point-like events of object creation.

1. Spatial Data Uncertainty (SDU)
2. Temporal Data Uncertainty (TDU)
3. Spatio-Temporal Data Uncertainty (STDU)

Design Space of Uncertainty Data

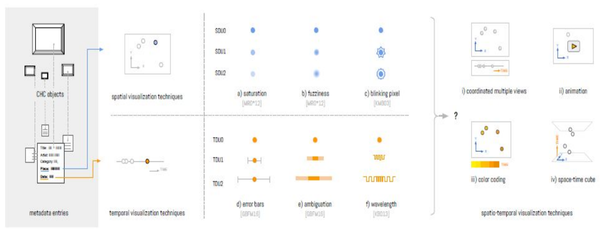


Figure 1: *The research question of this paper arises from the challenge to transfer options to visualize spatial (top) and temporal (bottom) object origins with various uncertainty levels (center) into the design space of spatio-temporal visualization techniques (right).*

Examples of Uncertainty in our Project

Starting Date	SPATIAL UNCERTAINTY (SDU)		Acts	References
	Minor Spatial Uncertainty SDU1	Major Spatial Uncertainty SDU2		
2-Apr	(4\7)-C\1-R	(3\7)-C\3-R	7-C	4-R
	St.Romanos	Konstantinople	Ottoman Army arrived to Konstantinople	
	Golden Door to Coastal			
	Golden Door to Wooden Door			
	Galata			
	(4\5)-N\3-R		5-N	3-R
	Golden Horne		Golden Horne is chained	

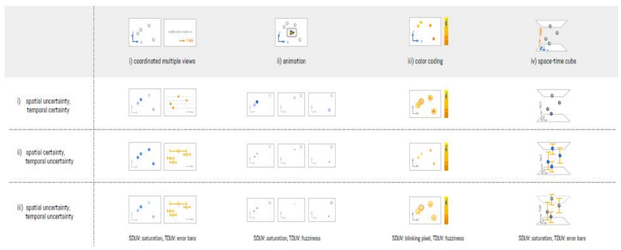
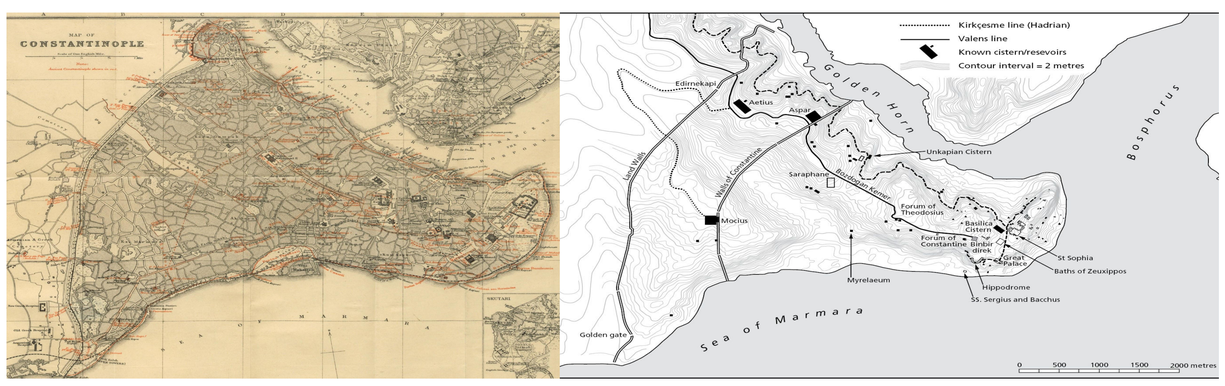


Figure 2: *Design space for spatial, temporal and spatio-temporal uncertainty visualization for four different visualization techniques.*

Starting Date	TEMPORAL UNCERTAINTY (TDU)		Acts	References
	Point-Based Uncertainty TDU1	Interval-Based Uncertainty TDU2		
2-Apr	4-R		Ottoman Army arrived to Konstantinople	5-R
5-Apr	1-R			
12-Apr\18-Apr		1-R	Ottoman Army occupy Büyükada	2-R
18-Apr\19-Apr		1-R		

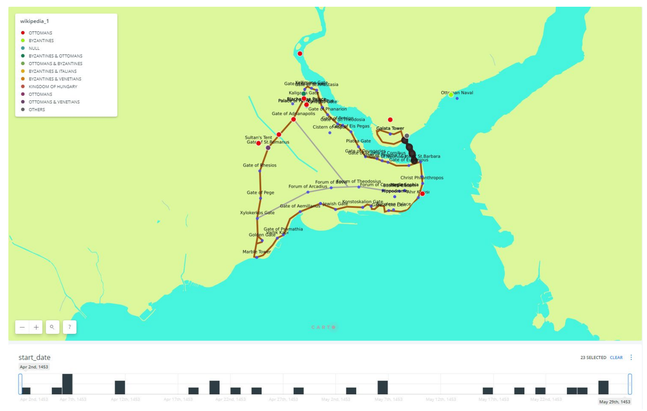
Methodology

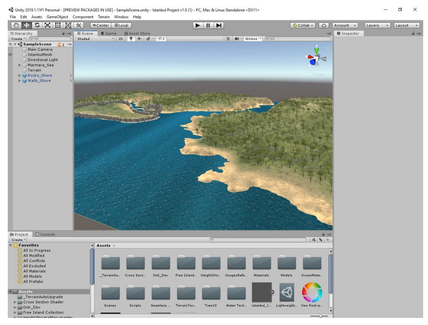
The map resources showing the city of Constantinople are utilized to locate the events that take place in the locations of the old city. Historical books and texts including primary and secondary sources are combined with these maps to write an event log, to project the data on the Carto map and to reflect spatio-temporal data of the conquest throughout the time.



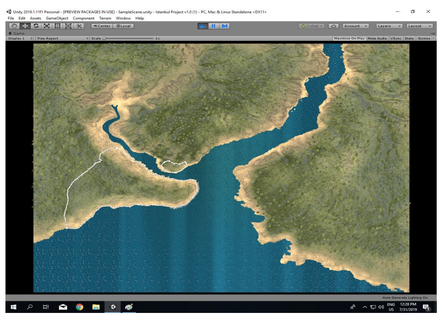
PostgreSQL is used as the SQL database for the project. The data gathered from the maps and texts are stored on Google Sheets as tables. The data written on the rows are sorted with respect to their original source. The columns comprising of the parameters such as actor, act, time and place determine the specific variants for each event that happened during the conquest.

The 2D projection of the data has been created on Carto map tool. Unique symbols mark the location names, landmarks and the actors that the event log refers to. The uncertainty in the event data is expressed by distinguished colouring and shaping methods so that the project visualizes the events by applying an objective perspective. Selections attached next to the map provide settings for specific timeline and source options. Selecting the sources and adjusting the time interval as desired enable comparisons between the events recorded on the sources and gives an insight about how "the Conquest" happened. In the creation of this map, the data recorded as the tables is combined with the historically approximate coordinates of the locations.

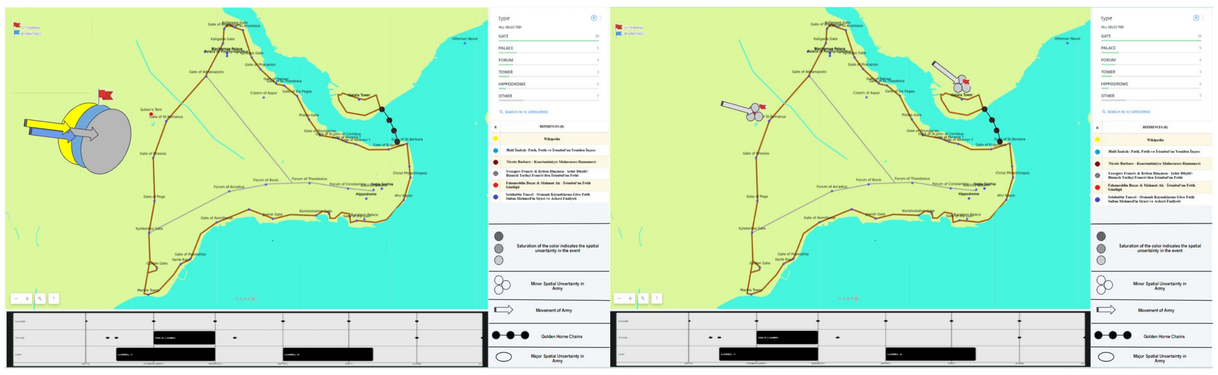




As a future plan, Unity is the modelling tool that will generate the 3D projection of the Fall of Constantinople.



Mock Up Screen



Two frames of the project, representing the events that is captured on the date of April 2 and demonstrating the spatial uncertainty utilizing distinguished shapes and colors with respect to the references.

References

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