Spatial Hypertexts or Hypermaps: A Proposal for Using Maps as Hypertexts in Geo-spatial Archives

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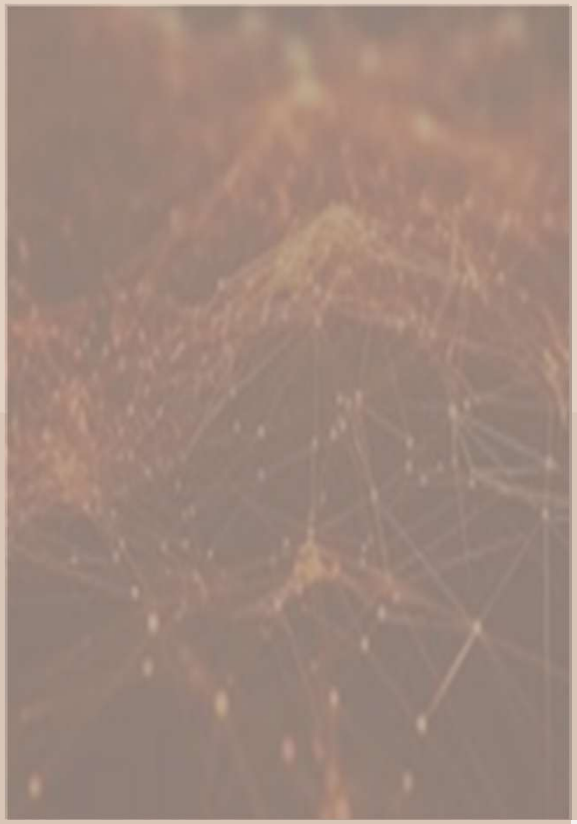


RESEARCH OBJECTIVES

In this paper we propose using digital maps as spatial hypertext in DH geo-spatial archive which in turn will facilitate a deeper spatial analysis of the geolocation visualised.

1. Define and establish geo-spatial archives in DH and characteristics.
2. Digital maps as spatial hypertexts within a geo-spatial DH archive - Prototype of a geo-spatial archive on Dalit massacres.
3. Methods, tools, and opportunities of using spatial hypertext within DH geo-spatial projects.

Initiate discussions . . .

Keywords:

Spatial Hypertext

Geo-spatial Archive

Hypertext

Digital Humanities

Digital Cartography

Deep Mapping

INTRODUCTION

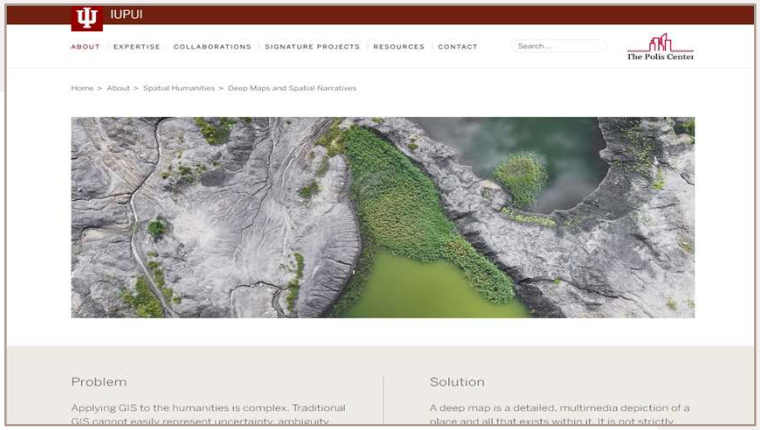
- "An archive consists of records which have been selected for permanent or long-term preservation for their historical value, enduring research value, operational needs and risk of content loss. . . **Digital archive seeks to preserve the information in digital format regardless of media on which that information is stored** (Niven 2011)" (Yadav 2016, 63).
- Digital archives increased the access to rare manuscripts and texts – **new ways of reading** (like non-linear reading) (Stokes 2013).
- In DH projects "**archival materials combine traditional humanities research with computational methods**" (Note 2022).
- Beginning of DH projects could be traced to building of "**digital archives, databases, and tools to provide access to materials—projects that resembled the work of libraries more than scholars**" (Stokes 2013, 7).
- '**Spatial turn**' in traditional humanities and DH - geo-spatial projects - archive important multimedia documents.

- Examples of geo-spatial DH projects –

Deep Map and Spatial Narrative Project at the IUPUI

Deep Map of the English Lake District at Lancaster University

- These projects have successfully blended **multiple forms of media like images, annotated texts and georeferenced historical maps on a single base map**. Fig 1.



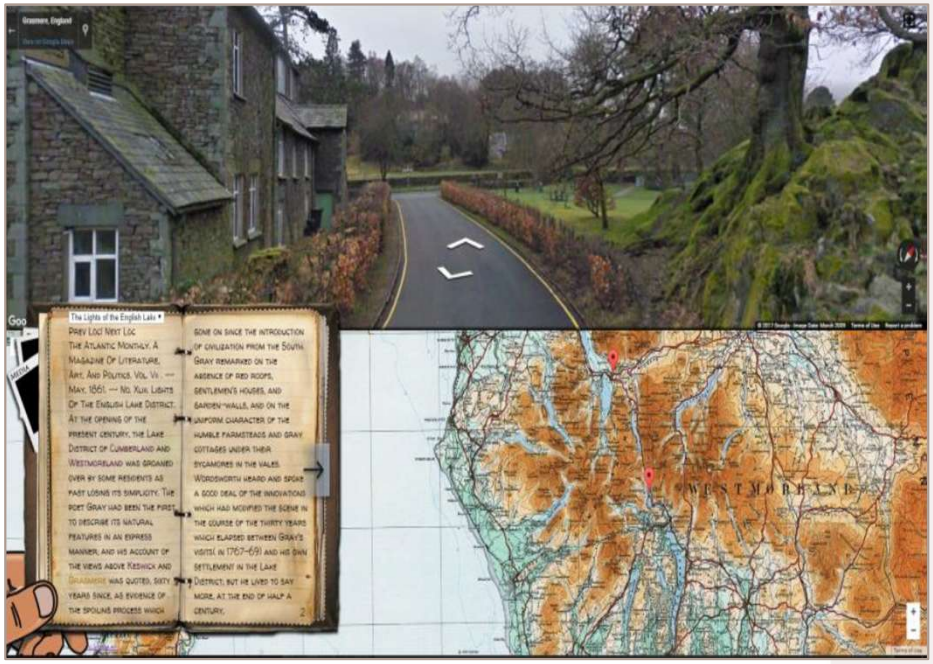


Figure 1: Prototype *Deep Map of the Lake District* that blends historical maps with Google Street View imagery alongside an extract from the Corpus of Lake District Writing that focuses on this location. Image credit: Alexander Reinhold.

- Authorial London by the Stanford University, Artists in Paris by Queen Mary University of London - interactive web-map based spatial humanities project - different base maps - visualise year wise data on a static geo-referenced base map
- **Interactive maps with hyperlinked media - incorporation of geographical hypermaps**.
- Better understand – ex in Artists in Paris project

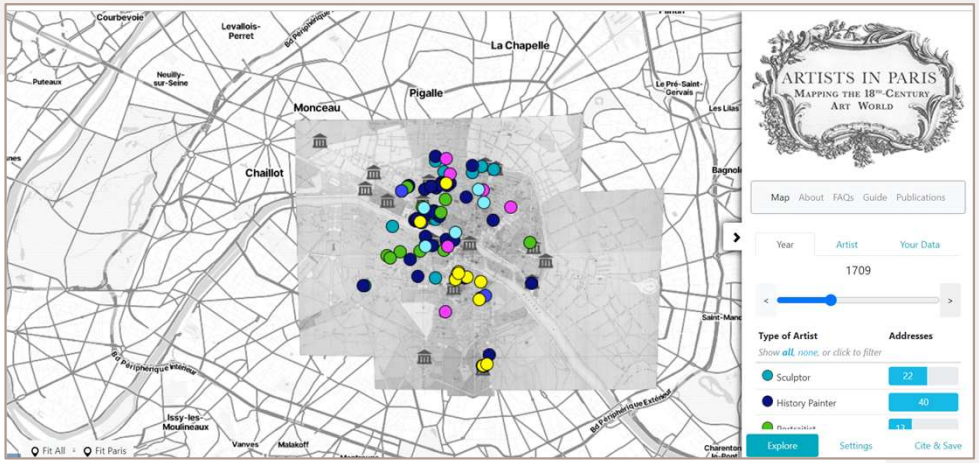
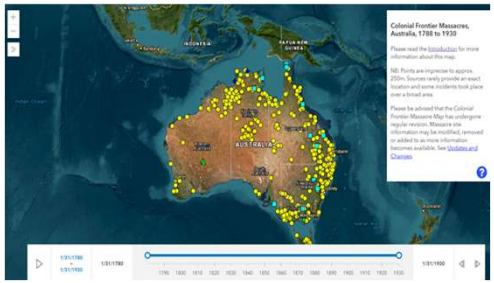


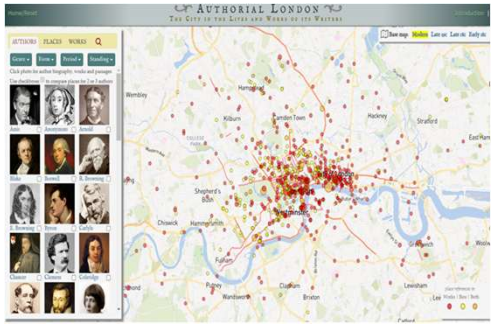
Figure 2: Screenshot of the *Artists in Paris* project showing the location of artists in Paris during the year 1709.

- Definition - geo-spatial archive in Digital Humanities (DH) – **reluctance** to use 'spatial archive' or 'geo-spatial archive' by DH projects
- **Literature** on geo-spatial archives in DH (Foley and Murphy 2015; Hu, Karna, and Hildebrandt 2018) provide methodology and steps

We define geo-spatial archives in DH as,

> *Open-access DH projects that connect historical, narrative and or textual materials with geospatial coordinates for long-term preservation. The project then visualises the materials to physical place/s using an interactive digital map which in turn serve as a geo-spatial archive of the materials that can facilitate further analysis.*





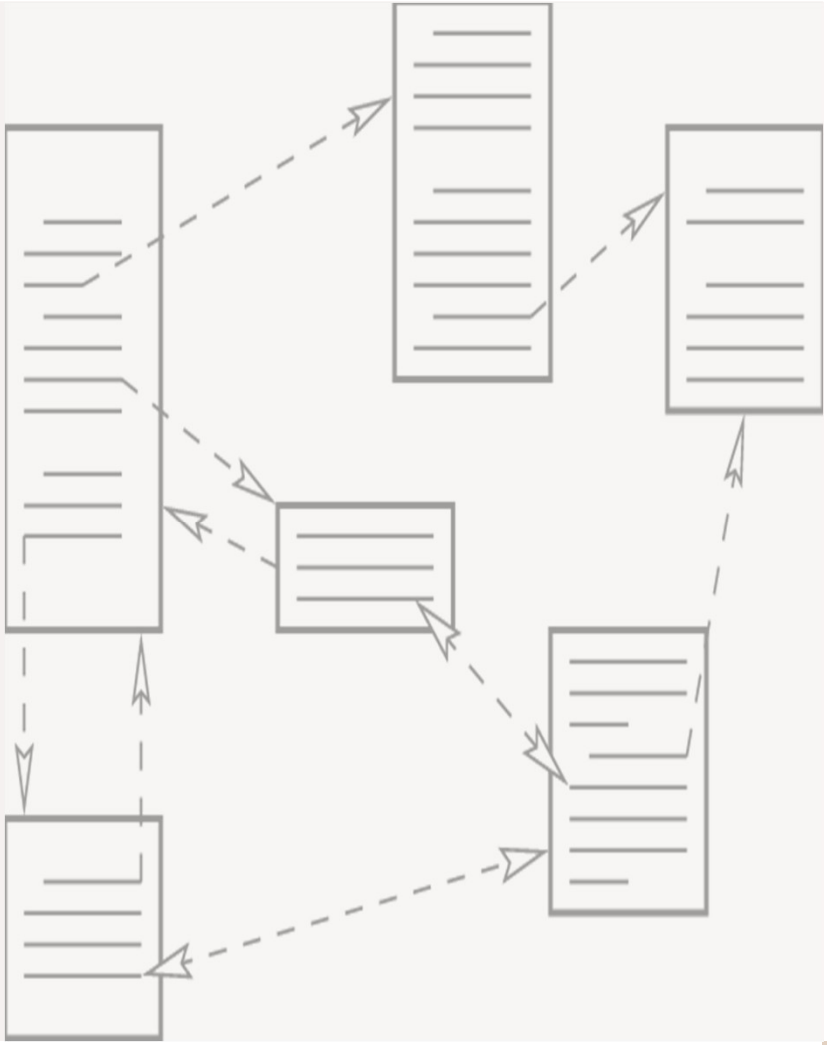
Geo-Spatial

Archives

Classification	Characteristics	This Paper. . .
Thematic: Race and Gender (Colonial Frontier Massacres, Australia). **Literature**: places in literature and literary authors (Authorial London). **History**: The Atlas of early Printing. **Culture**: Going to the Show.	**Open-access**. Use of **spatial** or geographical **datasets**. **Interactive map** and map-like visualization. Availability of **multimedia data** through the maps.	**Geo-tagging the multimedia data in maps** with geolocatable physical coordinates.

BACKGROUND

- Spatial Hypertext, Cartographic Hyperdocuments (Milleret-Raffort 1995), Hypermaps (Kraak and Driel 1997), Geographic Hypermedia (GH) (Kong and Liu 2011), Geographic hypermedia system (GHS) (Kong and Liu 2011) and hyperlocal (Stokes 2013)
- We - hypermaps or spatial hypertext
- Hypertext has different definitions in different disciplines like literature and computer science (Wardrip-Fruin 2004).
- “Hypertext is text which is not constrained to be linear; Or it’s the text which contains links/references to other texts (that a reader can immediately access). The term was coined by Ted Nelson around 1965” (Ganore n.d., 1).



Hypertext vs Hyperlink

"Hypertext is built upon the singular premise inherent in its basic definition, linked text, including all its possibilities both structurally and semantically" (Lang and Baehr 2023, 53).

Hypertext refers to the text containing the hyperlink

"Hypertext documents are interconnected by hyperlinks, which are typically activated by a mouse click, keypress set or by touching the screen" (Ganore n.d., 1-2).

"Hyperlinking includes the basic feature that any section of content, whether visual, spatial, or textual, can be associatively linked to others based on a discrete semantic relationship" (Lang and Baehr 2023, 53).

Hyperlink is comprised of URLs.

Common hypertext - document-centred hypertext had limitations as users can get lost in the hyperspace of large networks of interconnected documents (Solis and Ali 2010).

Spatial Hypertext

- "Spatial hypertext is a kind of hypermedia that is based on using visual and spatial characteristics to define relations among hypertext elements, which are seen as 'sticky notes'or bibliographic cards that can hold hypermedia content (text, images, hyperlinks, etc.)" (Solis and Ali 2010, 238).
- Shipman and Marshall (1999, 2) - spatial hypertexts "allows users to take advantage of their visual memory and pattern recognition".
- Spatial hypertext - network maps with nodes and links and not geographical maps.
- **Critspace** (Audenaert, Lucchese, and Furuta 2010).

On Picasso - "provides an HTML based interface for accessing the collection maintained by the Picasso Project that contains nearly 14,000 artworks (including documents) and 9,500 biographical entries" (Audenaert et al. 2008, 51).

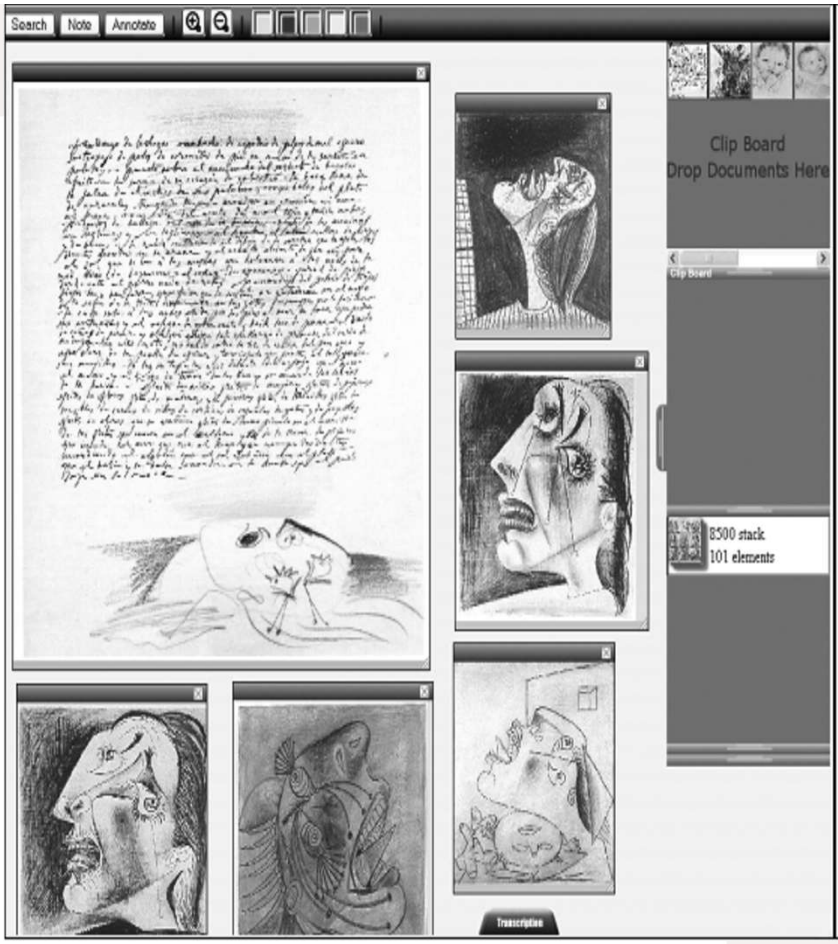


Figure 3: Screenshot of CritSpace showing a document along with several related preparatory sketches Picasso made for Guernica about the same time. (Source: Audenaert et al. 2008)

Hypermaps

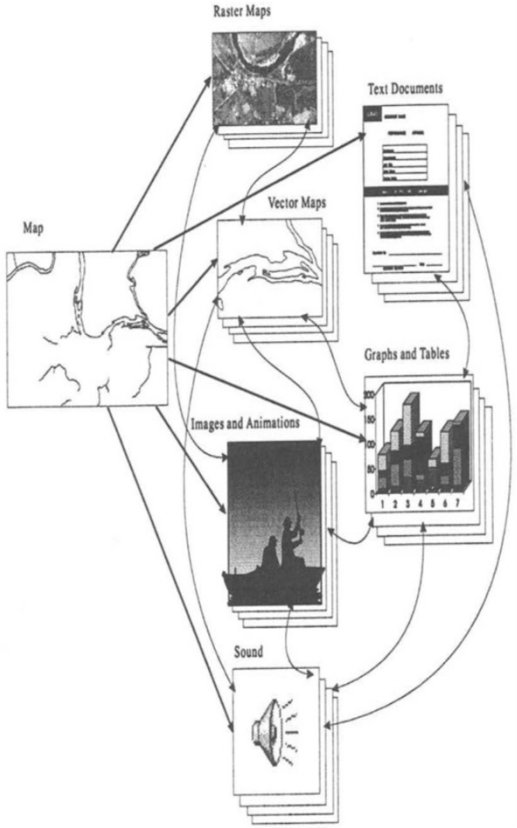
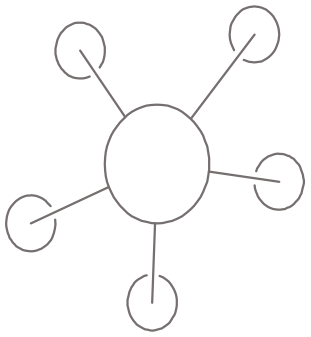


Figure 4: An example of a Hypermap Based Application (Source: Alencar et al. 1997).

- "Laurini and Milleret-Raffort (1990) introduced the term 'hypermap' - **a multimedia hyperdocument with geographical access**. Geographical access implies access by geographical coordinates. The idea behind the concept was the desire and ability to retrieve all documents related to a certain area" (Kraak and Driel 1997, 457).
- Hypermaps - maps, multimedia objects and links among these objects (Voisard 1998).
- Here, use of **geographical maps as hyper document or base document upon which further georeferenced multimedia systems (including further geographical hypermaps/maps) are arranged**.
- Base map - georeferenced hyperlinked maps or hypermaps and other multimedia containing more details about the places or areas under study.
- "Thus, the individual data elements are linked to maps to present the semantics related to the objects in the map, and to enhance the geographic information for further exploration, analysis, and presentation" (Alencar et al. 1997, 245).

- “Cartographic hyperdocuments (in short hypermaps) are based on the hypertext techniques for **automatic cartography**. They allow the user to **navigate between textual and cartographic information** nodes in order to get a well-documented representation of the space” (Milleret-Raffort 1995, 197).
- In hypermaps the new types of objects are considered as targets defined in terms of semantic units thereby facilitating the creation of links such as **map-to-map, map-to-image, image-to-map and map-to-text** among others (Voisard 1998).

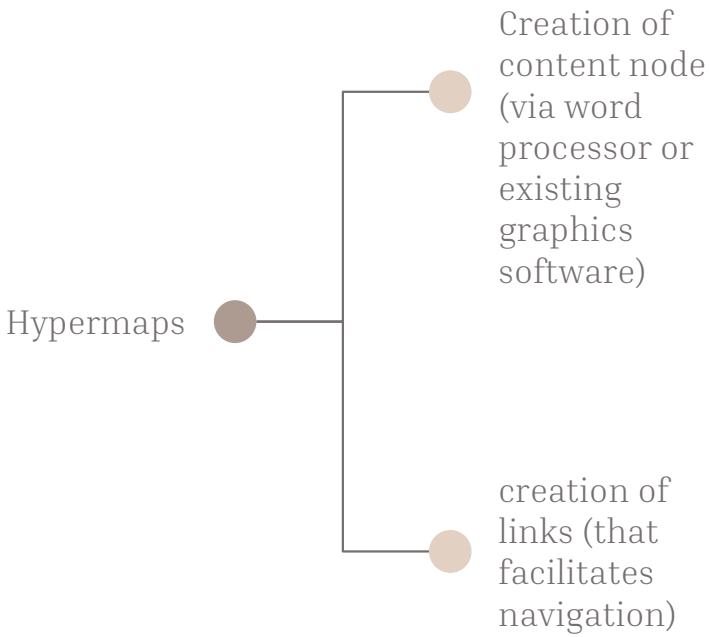


In DH. . .

- The use of cartographic hypermaps is quintessential to improving DH projects that makes use of geospatial technologies.
- Growing interest in utilizing geographic information systems (GIS) in the digital humanities and social sciences (DH).
- **GIS-based DH projects** usually emphasize spatial analysis and cartographic capability (e.g., displaying the locations of people, events, or movements), however, GIS alone cannot easily integrate multimedia components (e.g., descriptive text, photographs, digital audio, and video) of DH projects (Hu, Karna, and Hildebrandt 2018, 1).

- Platform to organise the multimedia components in a DH geo-spatial archive - A single mouse click
- **Hypermaps are therefore a georeferenced approach to hypermedia** (Kraak and Driel 1997).
- Both **thematic and spatial navigation within a geo-spatial archive** (Milleret-Raffort 1995).
- **Differ from geographic-based searching (or spatial browsing) for scanned maps and documents** such as the BTAA geoportal ("Big Ten Academic Alliance Geoportal," n.d.).

Milleret-Raffort (1995)



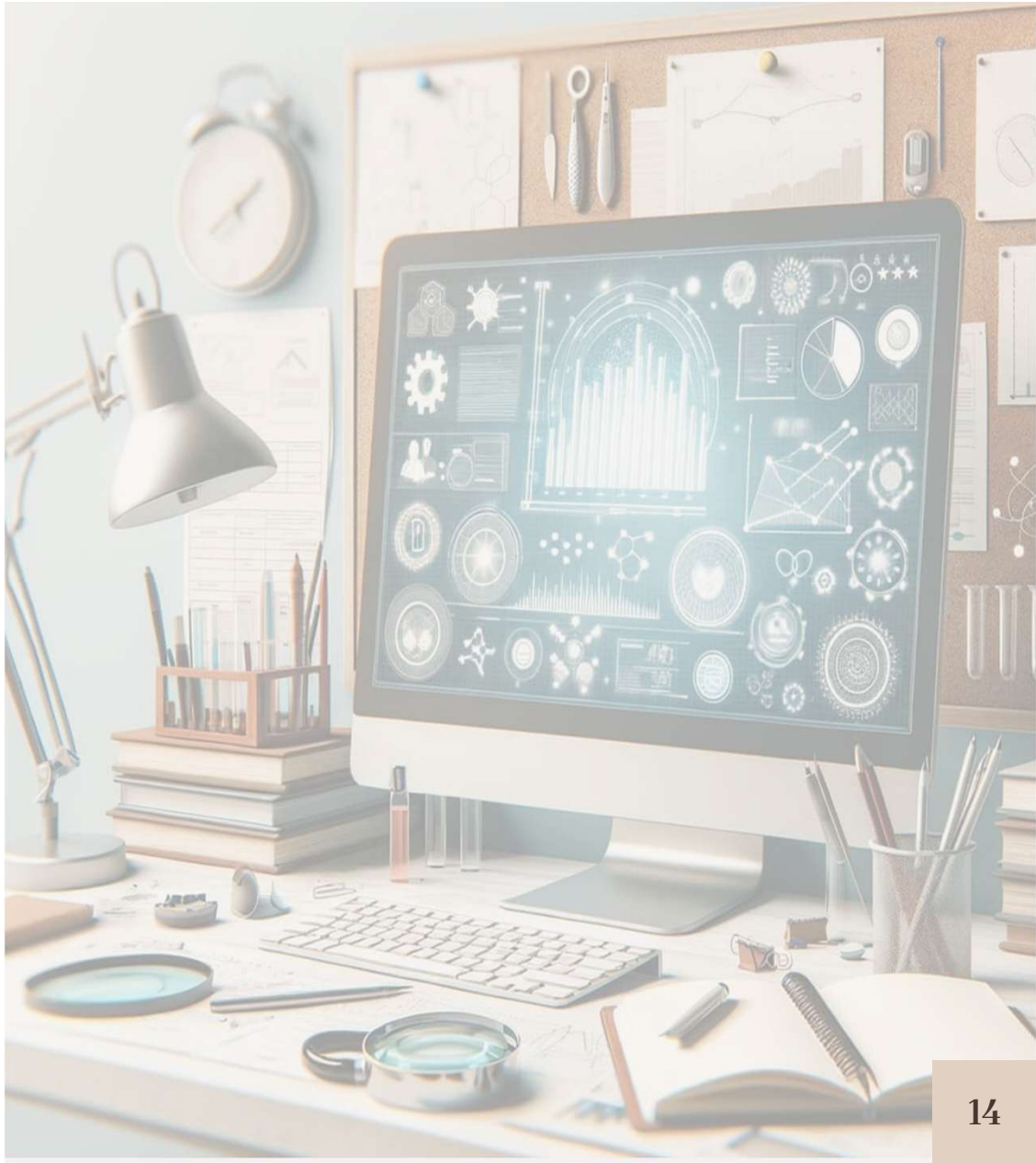
Functions (Kraak and Driel, 1997, 460-61):

1. access documents by spatial hypermap navigation (by clicking anywhere on the map);
2. access documents by thematic hypermap navigation
3. access documents by temporal hypermap navigation (by adding a time-tag in addition to the usual geotag and attribute tag)
4. apply filters in search and display
5. update the hypermap and storing hypermap data.

Hypermaps therefore serve as "a browser of geographical information systems" (Kraak and Driel 1997, 463).

Method and Prototype

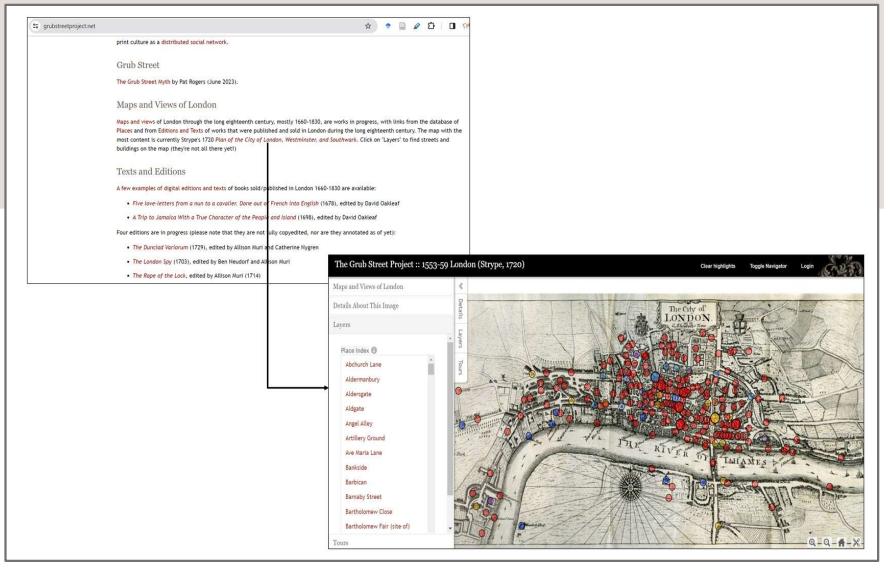
- Creation of web-based hypermaps for DH geo-spatial archive that are published online.
- ‘Spatial hypertext’ and ‘hypermaps’ – cartographic hypermaps
- Norton (2023, 1) - “digital Ulysses project that applies hypertext/hypermedia, GIS, and wiki technology to provide users with easier **access to all the materials necessary to contextualize the novel and add their own interpretations**”.
- Focus on annotation of hypertext/hypermedia and not cartographic hypertext



Text-to-Map Hypermap in which maps are embedded as hyperlink to a text or description in the archive.

From a text or other multimedia to a geographical map.

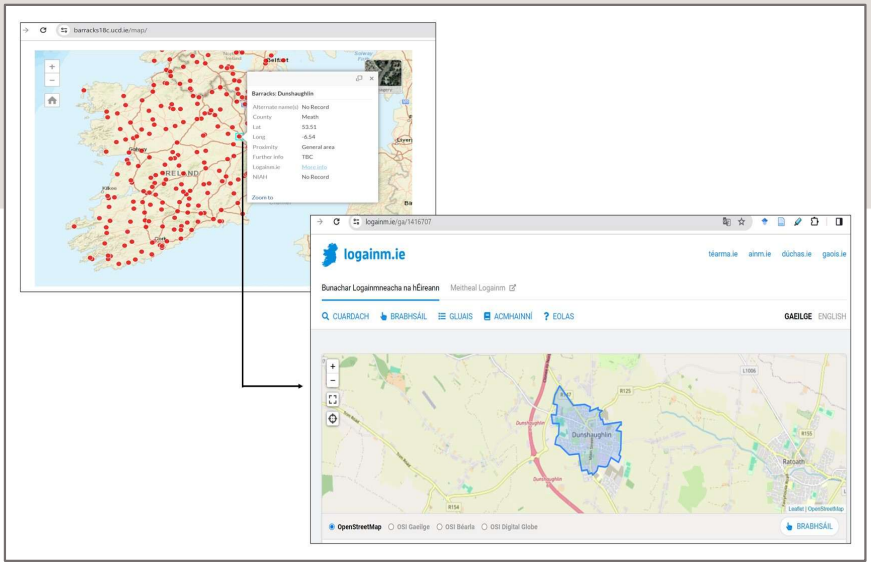
Ex: Grub Street Project - spatial hypertexts in the ‘Maps and Views of London’ section will redirect the viewers to the respective maps as shown in Figure.



Map-to-Map Hypermap in which maps are embedded as hyperlink to a map that is already visualised in the archive.

From one geographical map to another.

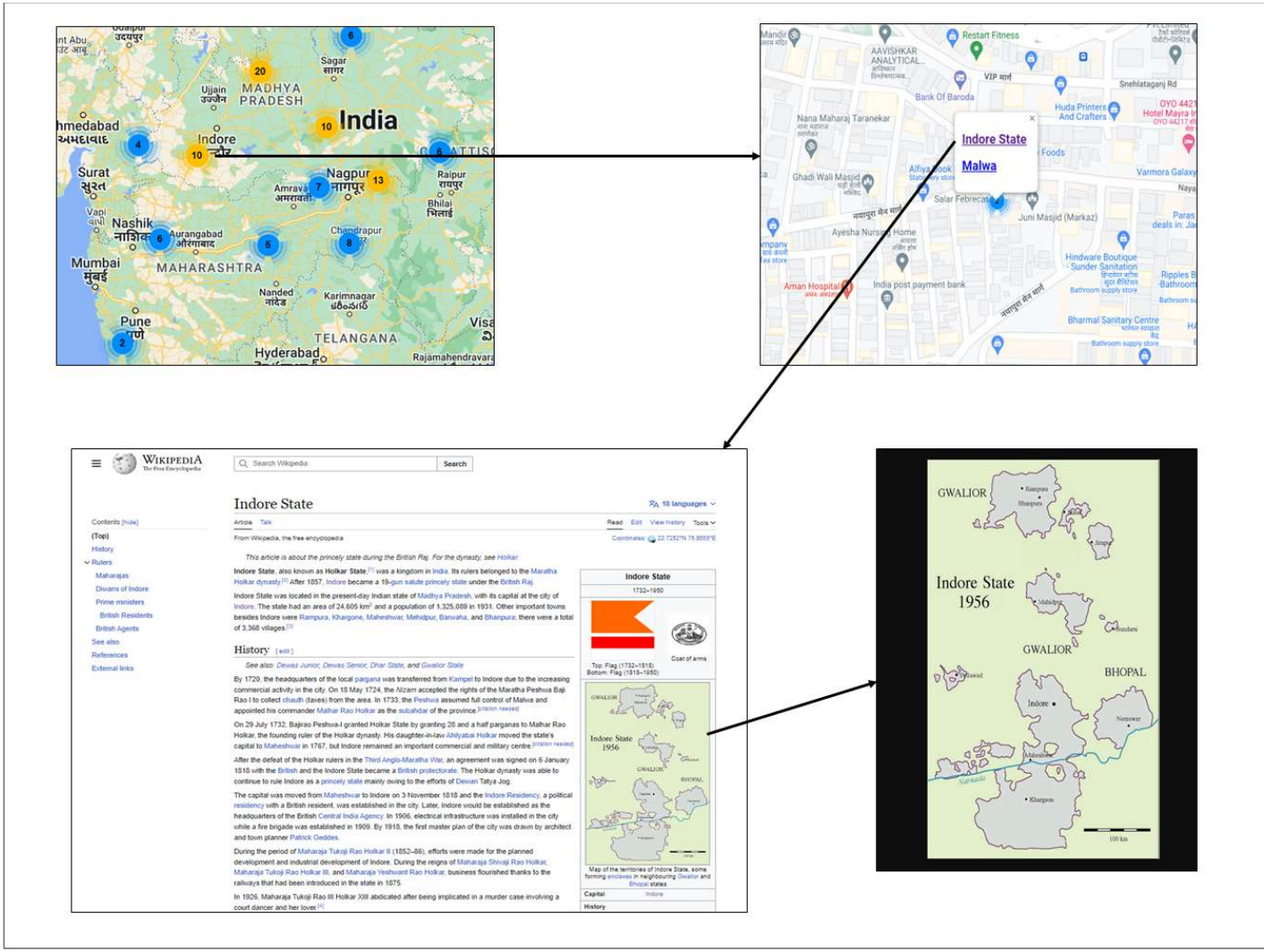
Ex: Army Barracks of Eighteenth-Century Ireland - interactive points on the main map will take the readers to a detailed map of the selected location as shown in the Figure.



- Mapping platforms such as google maps and GIS softwares.
- Ex of interlinked geographical hypermap system is **wikimaps**.

"Wikimaps visualise the **evolution of links over time between wikipedia articles in different subject areas**" (Kleeb, Gloor, Nemoto, and Henninger 2012, 204).

- Links on the map does not directly take the readers to a hyperlinked cartographic map.
- Wikimaps doesn't follow the direct hypermap system that we are proposing in this article



Prototype

PROJECT

Examines the relation among caste, gender and space in selected massacres in independent India through a geo-spatial archive of the female survivors of the massacres.

MARICHJHAPI MASSACRE

Marichjhapi massacre using feminist geocriticism and digital cartography (Justin and Menon 2023b).

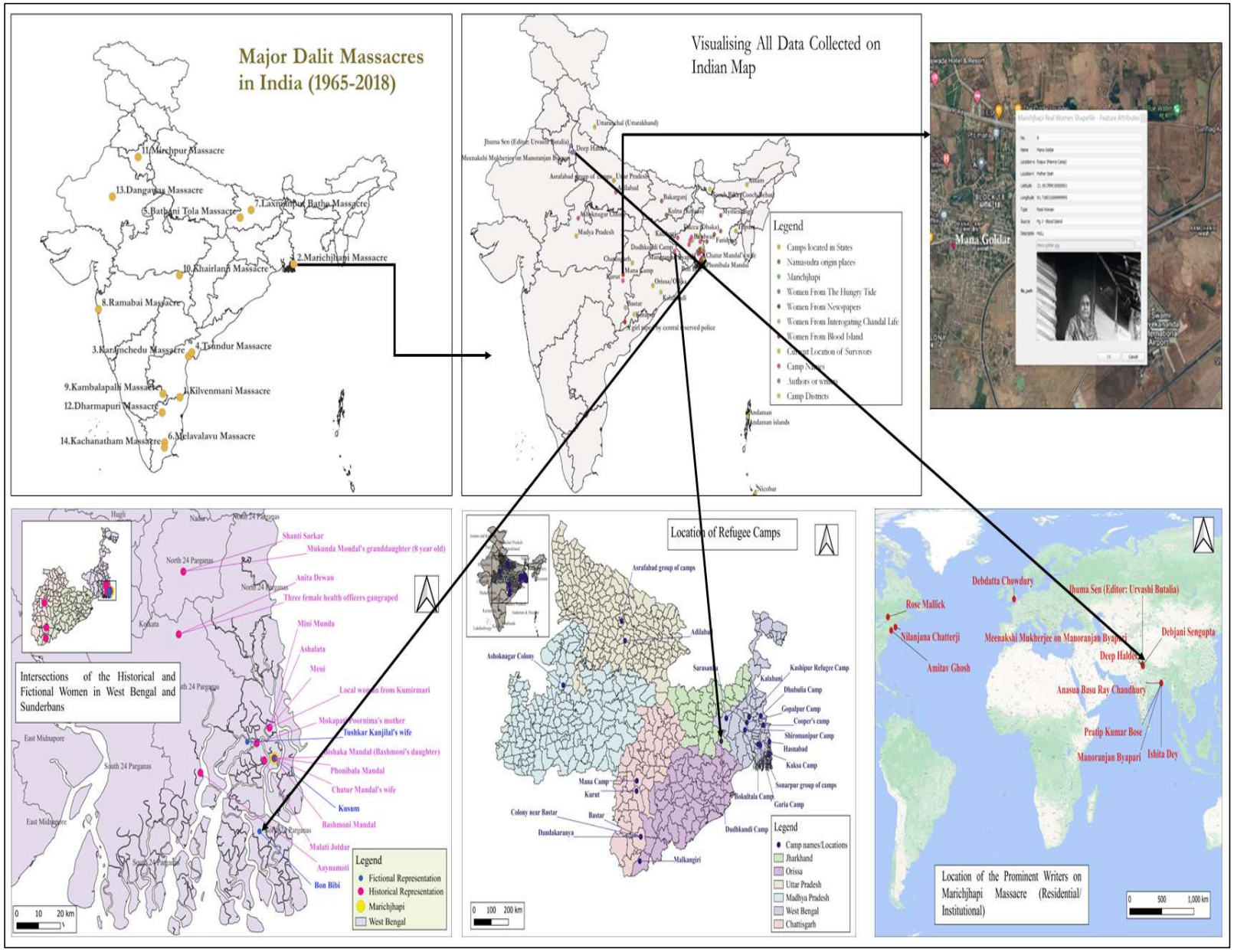
Combination of digital cartography and feminist Geocriticism is detailed in (Justin and Menon 2021).

METHODOLOGY

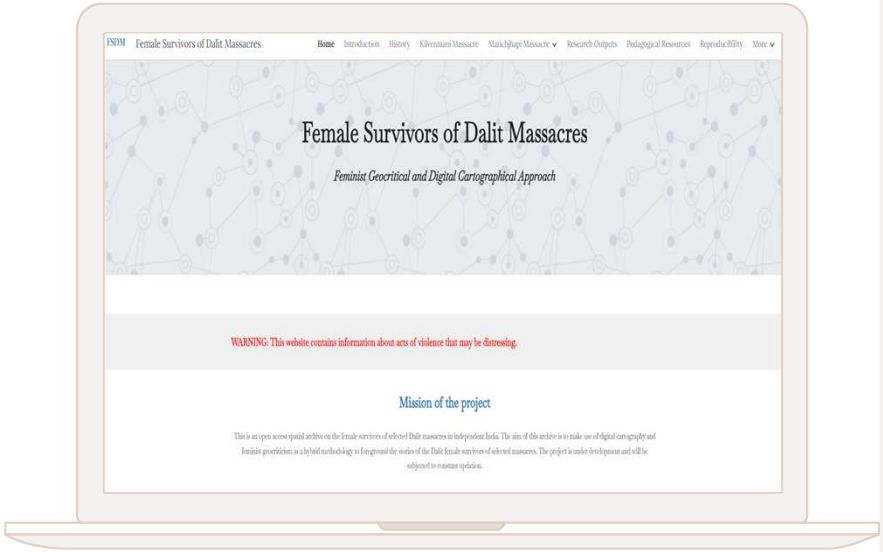
Fictional and non-fictional texts
multiple formats of data

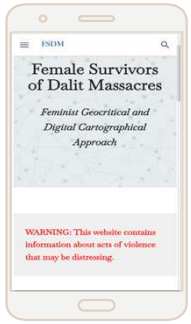
MATERIALS

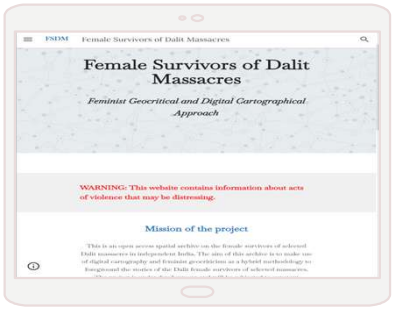
- **Map-to-map hypermaps** in the archive as the aim is to create a spatial archive, though a combination of both map-to-map and text-to-map hypermaps will also be used.
- The main map or the base map of the spatial archive will feature selected Dalit massacres in post-independent India.
- Each massacre (represented as a point on the map) will be geocoded and hyperlinked with the data collected from various literary and non-literary sources.
- Here the data will be geocoded using latitudinal and longitudinal values.
- A completed hypermap on a massacre will contain "**thematic layers, or thematic maps, where each layer is a collection of geographic or geologic objects**" (Voisard 1998, 15).
- Thematically mapped into different layers such as historical representation, fictional characters, refugee camps and feminist organisations among others.
- There will also be an option to hide layers in the hypermap of a massacre so that the readers can analyse the layers according to their specific needs.
- These thematic layers will be further geocoded or geotagged with other forms of media like text, images and videos if any.


Major Dalit Massacres in India (1965-2018)
11.Mirchpur Massacre
13.Dangavas Massacre
5.Bathani Tola Massacre
7.Laxmanpur Bathe Massacre
2.Marichjhapi Massacre
10.Khairlanji Massacre
8.Ramabai Massacre
3.Karamchedu Massacre
4.Tsundur Massacre
9.Kambalapalli Massacre
1.Kilvenmani Massacre
12.Dharmapuri Massacre
14.Kachanatham Massacre
6.Melavalavu Massacre
Visualising All Data Collected on Indian Map
Legend
Camps located in States
Namasudra origin places
Marichjhapi
Women From The Hungry Tide
Women From Newspapers
Women From Interogating Chandal Life
Women From Blood Island
Current Location of Survivors
Camp Names
Authors or writers
Camp Districts
Mana Goldar
Intersections of the Historical and Fictional Women in West Bengal and Sunderbans
Shanti Sarkar
Mukunda Mondal's granddaughter (8 year old)
Anita Dewan
Three female health officers gangraped
Mini Munda
Ashalata
Meni
Local women from Kumirmari
Mokapada Soornima's mother
Tushkar Kanjilal's wife
Bishaka Mandal (Bashmoni's daughter)
Phonibala Mandal
Chatur Mandal's wife
Kusum
Bashmoni Mandal
Malati Jotdar
Aaynamoti
Bon Bibi
Legend
Fictional Representation
Historical Representation
Marichjhapi
West Bengal
Location of Refugee Camps
Asrafabad group of camps
Ashoknagar Colony
Kashipur Refugee Camp
Dhubulia Camp
Gopalpur Camp
Cooper's camp
Shiromanipur Camp
Hasnabad
Kaksa Camp
Sonarpur group of camps
Bokultala Camp
Garia Camp
Dudhkandi Camp
Mana Camp
Kurut
Colony near Bastar
Bastar
Dandakaranya
Malkangiri
Legend
Camp names/Locations
Jharkhand
Orissa
Uttar Pradesh
Madhya Pradesh
West Bengal
Chattisgarh
Debdatta Chowdury
Jhuma Sen (Editor: Urvashi Butalia)
Rose Mallick
Nilanjana Chatterji
Meenakshi Mukherjee on Manoranjan Byapari
Debjani Sengupta
Deep Halder
Amitav Ghosh
Anasua Basu Ray Chaudhury
Pratip Kumar Bose
Manoranjan Byapari
Ishita Dey
Location of the Prominent Writers on Marichjhapi Massacre (Residential/ Institutional)

- While we are clear about the proposal of geographical hypermaps as hypertexts and are demonstrating this through a prototype, the work to implement a system prototype is **only starting**.
- We acknowledge the **complexities** in proposing this model due to different dimension of space, location and temporal relations with and within documents.
- With respect to the **time-frame**, we are only considering the Dalit massacres after Indian independence (1947).
- As a starting point we are focusing on the prominent massacres in each decade. Hence, we have completed the preliminary analysis of **Kilvenmani massacre (1968)** and **Marichjhapi massacre (1979)** from the first two decades after Indian independence.
- The archive will be mostly focusing on **2D depiction** of the places through maps as it will be difficult to portray the hypermaps in 3D.







https://sites.google.com/iiti.ac.in/femalesurvivorsofdalitmassacre/home

Possibilities and Challenges in Using Hypermaps in DH Spatial Archives

Possibilities

- Maps as hypertext or hypermaps can be used in **research papers** as well.
- Hypermaps while offering interactivity to the users, also facilitates **horizontal and vertical forms of reading and analysis**.
- Hypermaps are efficient in **structuring and navigating a georeferenced hypermedia database** (Kraak and Driel 1997, 463).
- Hypermaps contributes to **new understandings of the relationship between space and the topic under study**.
- Hypermaps are **the future of web-based archiving** as it can have extensive effect on a variety of sectors like history, the humanities, and cultural repositories (Stokes 2013, 15).
- Use of hypermaps result in the creation of a **geospatially informed Digital Humanities**, with geo-tagged spatial connections which in turn help with **designing spatial research in DH** (Foley and Murphy 2015).
- The flexibility of spatial hypertext supports **volatility and change** (Marshall and Shipman 1995, 91) thereby making it easier to alter and update the data as per requirement.
- Spatial hypertexts or hypermaps can also be used in **website of libraries, archives and museums**.

Challenges

- A major challenge in implementing hypermaps in DH geo-spatial archive is the **lack of awareness about the basic technologies, terminologies, and concepts related to spatial archives**.
- Maps when used as hypertexts, should provide the **context** in which it is used while visualising the data and its analysis (if any).
- Creation of hypermaps can be a **tedious task**, especially for digital humanists without technical training. Therefore, it is important to **collaborate** (collaboration is an important part of DH projects) with technically skilled people from other disciplines.

- The **complex geospatial tools (like GIS)** currently available might not support the creation of hypermaps especially in the context of fictional places (in the case of literary mapping projects).
- Milleret-Raffort (1995, 207) - '**cognitive overload**'. "When there are several windows, with different types of links, the user can get lost. Presently, for this problem, we have no complete or ideal solution to propose. A possibility could be to maintain a list of the visited nodes with their titles. So, when lost, the navigator can return to a previous node of interest."

Conclusions

Important

An **increasing number** of novel projects coming up each year across the world.

“A number of Digital Humanities projects involve some interaction with geographic data. Many of these projects involve attempts to address historical questions by applying GIS or digital mapping tools” (Stokes 2013, 15).

Unrecognised

Existing projects do not identify as a spatial archive.

Geo-spatial archives in DH are mostly website-based projects that seek to document, represent, and communicate histories of a discrete social space using GIS and are populated with multimedia content managed in relational databases (Stokes 2013).

This paper

Define and understand the concept of geo-spatial archives from a **Digital Humanities** perspective.

Types and characteristics.

Propose the usage of hypermaps or spatial hypertext.

Prototype.

Capture the attention of the spatial digital humanists.

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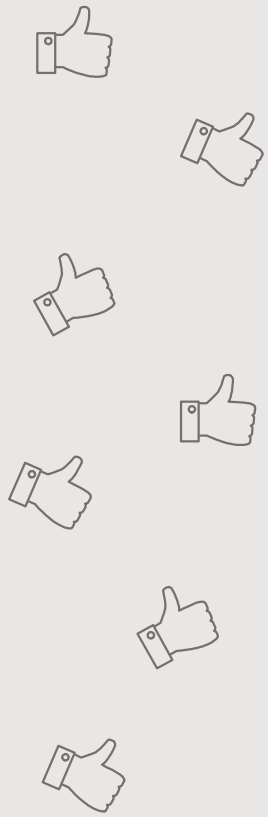

Thank You for Listening!