Narratives of Court Judgment:
A Visualization Approach

Chang Han
Email: changhan@sci.utah.edu
UID: u1472415

Syed Fahim Ahmed
Email: u1419916@utah.edu
UID: u1419916

Guanqun Ma
Email: guanqun.ma@utah.edu
UID: u1435513

Project Repository:
GitHub Repository

1.Background and Motivation

1.1 Legal Judgment is very hard to understand

In law, a judgment is a decision of a court regarding the rights and liabilities of parties in a legal action or proceeding [8].

Legal judgment documents can be highly technical and filled with legal terminology. For ordinary individuals, there is a high threshold for understanding the legal judgment documents. Sometimes, we don't need to know all the specific details of a judgment, only need to have an understanding of the framework and key information of the judgment. Reading and comprehending the entire document is not a very practical approach.

1.2 Visualizing helps to understand data

Visual can help people understand information more effectively. In this project, we mainly use narrative maps. Narratives are fundamental to our understanding of the entire world [1]. They play a key role in collaborative sensemaking in society [3].

Humans use narratives as a natural way to capture relations between events and associate them [2].

Narrative visualization is a form of data visualization that combines storytelling with data to convey data effectively [4]. In our project, we will extract narratives from judgment documents describing the cases in the form of narrative maps [5]. They are the representation of narratives based on a route metaphor.

1.3 Extract a narrative representation

A large language model (LLM) is trained to understand and generate natural language text. They recognize, summarize, translate, predict, and generate content using very large datasets [6]. There are many notable examples, including OpenAI's GPT models (e.g., GPT-3.5 and GPT-4), Google's PaLM and Meta's LLaMa [7].

As LLMs are adept at understanding and analyzing text, we can let them analyze the legal judgment document. Let the LLM summarize the main points depicted in the documents. They can quickly generate narrative representations that complement the narrative map. For example, we can extract the summary of procedural history, statements of facts, applicable law, and conclusion by LLM, which are the key information we are concerned about the judgment [8].

1.4 LLM makes visual judgments easier

We can use the extracted narrative representation to visualize the narrative map. By controlling the level of detail in information extraction and increasing interactivity, we can make the narrative map meet the needs of more people. It can simplify complex legal arguments and make the content more accessible to a broader audience, especially people without legal training. People could quickly grasp the framework and key information of a judgment.

The visualization of judgements can also be used to teach legal concepts and case analysis. It could fully utilize the advantage of narrative visualization.

1.5 Limitations and concerns of using LLM

The LLM model also comes with several limitations and concerns. It may lead to biased outputs. It relies on the training data. We cannot guarantee its training data is complete and right. And we lack control of the output.

But we cannot deny the advantage of LLM in the extraction process. In the real application, we cannot rely solely on LLM for the narrative representation extraction. Manual review and intervention are necessary. In our project, as we just want to show the prototype of visualizing legal judgment documents, we would rely more on LLM, and show the visualization of several documents.

2.Project Objectives

Primary questions:

1. How to design narrative maps to convey the key information of the legal document.
2. What is the key information of the legal document?
3. How to make narrative maps concise and intuitive enough for ordinary people to understand its content without being overwhelmed by information.
4. How to use interaction or other tools to make enough information are visualized.

Learn and accomplish:

1. The basic skill: how to design and achieve a website.
2. How to achieve narrative visualization (narrative maps)
3. How to process data based on LLM.

Benefit:

1. Narrative visualization is a new area to us. We can explore this area to some extent.
2. Knowledge of visualization programming.
3. An attempt to use a LLM

3. Data Source

Harvard Law's CaseLaw Access Project

● **Website**: Our data comes from CaseLaw Access Project
● **Description**: This platform provides a rich archive of U.S. court cases across different jurisdictions and legal fields.
● **Data Format**: Multiple formats like JSON, XML, and bulk downloads are available.

4. Data Processing

Data Pre-processing

Text Extraction
- **JSON/XML Parsing**: Use Python libraries like json or xml.etree.ElementTree to parse the downloaded data.

Text Normalization
- **Standardize Formatting**: Convert all text to a standard format, removing any special characters or inconsistencies.

Text Segmentation
- **Identify Sections**: Use regular expressions or keyword matching to segment the legal documents into procedural history, statements of facts, applicable law, and conclusions.

Data Analysis

LLM for Text Summarization
- **Model Selection**: Choose an appropriate LLM like GPT-4 for summarization tasks.
- **Training/Fine Tuning**: If necessary, finetune the model on a subset of legal documents.
- **Summarization**: Use the LLM to summarize each section of the legal document.

Key Information Extraction
- **Keyword Extraction**: Use Natural Language Processing (NLP) techniques to extract key phrases, entities, and relationships.

Data Visualization
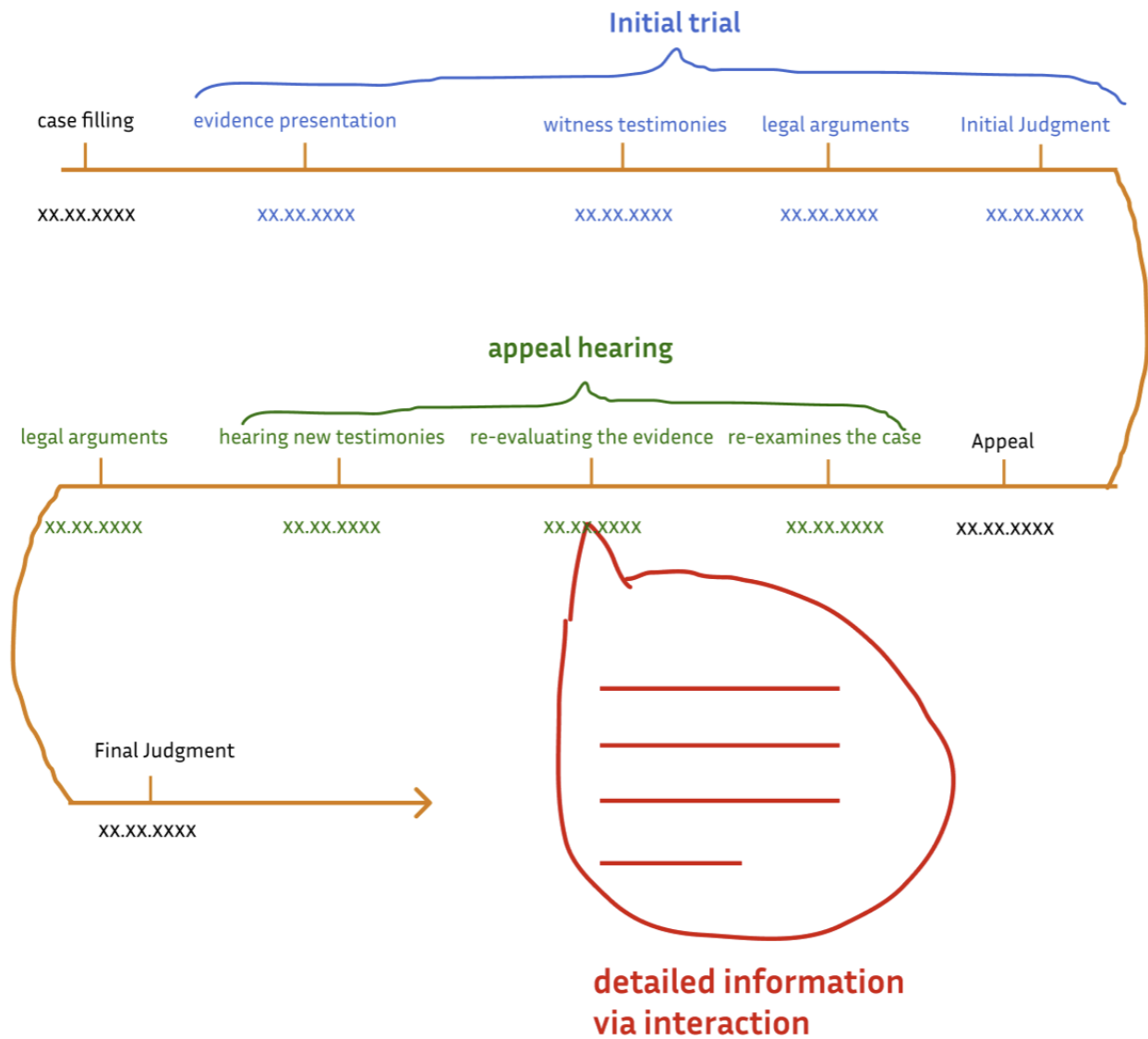
Narrative Map Creation
- **Design**: Sketch the layout and design elements of the narrative map.
- **Implementation**: Use D3.js or similar libraries to implement the narrative map.
- **Interactivity**: Add interactive elements like tooltips, zoom, and filters to allow users to explore the map.

Website Integration

- **Backend**: Use Django, Flask, or similar frameworks to set up the backend.
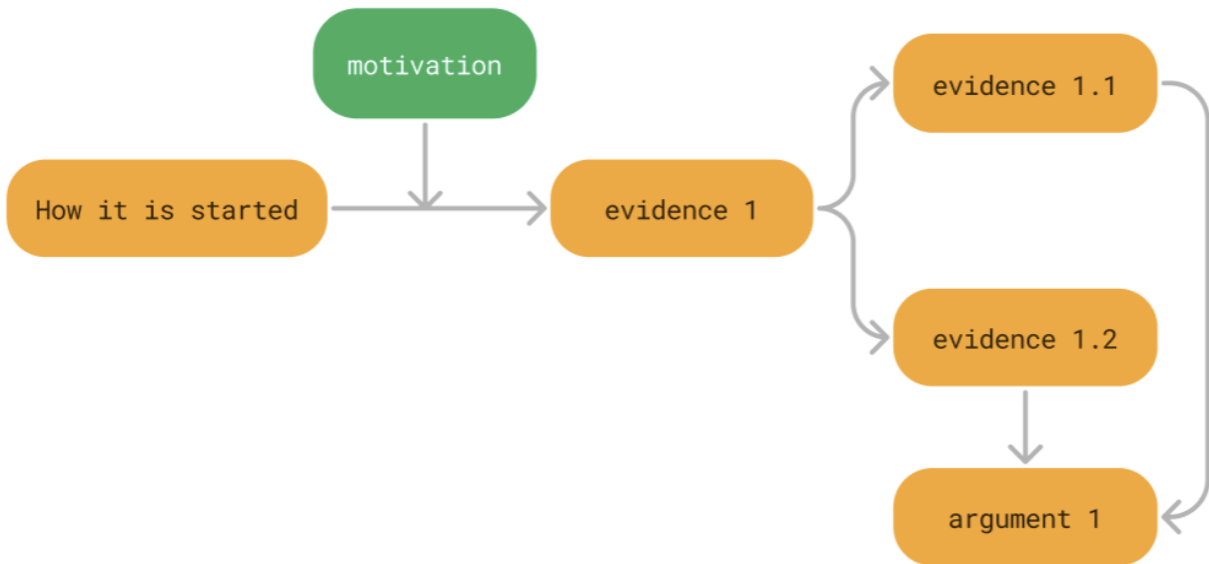- **Frontend**: Use HTML, CSS, and JavaScript to integrate the narrative map into the website.

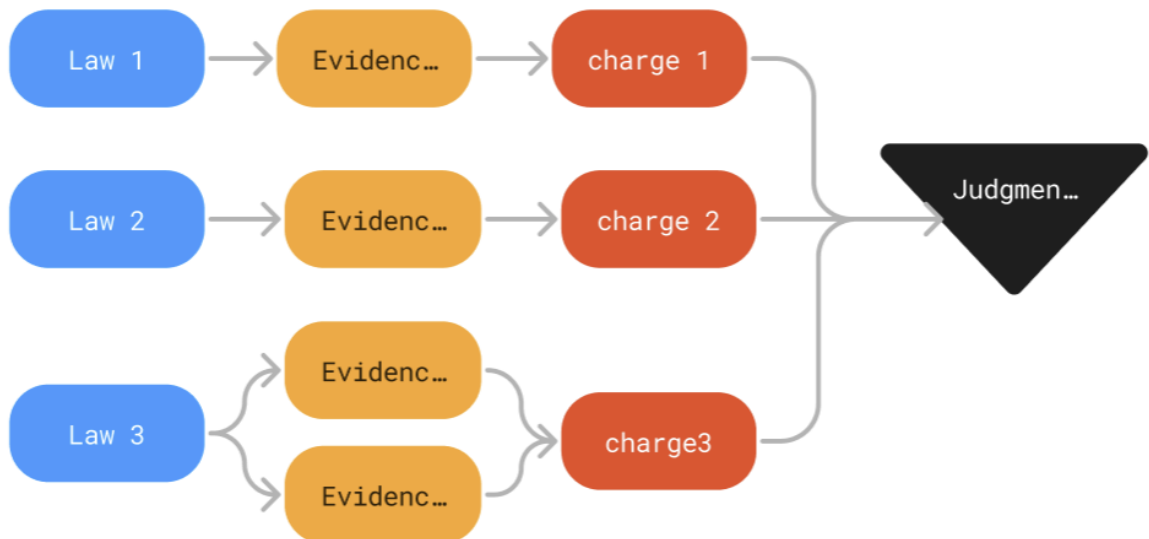# 5. Visualization Design

Timeline of the case

Initial trial

case filling	evidence presentation	witness testimonies	legal arguments	Initial Judgment
xx.xx.xxxx	xx.xx.xxxx	xx.xx.xxxx	xx.xx.xxxx	xx.xx.xxxx

appeal hearing

legal arguments	hearing new testimonies	re-evaluating the evidence	re-examines the case	Appeal
xx.xx.xxxx	xx.xx.xxxx	xx.xx.xxxx	xx.xx.xxxx	xx.xx.xxxx

Final Judgment

xx.xx.xxxx

detailed information via interaction

flowcharts

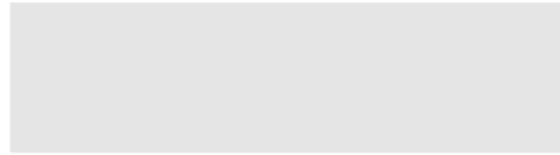## evidence presentation

Legal arguments

Infographic

names of the parties involved

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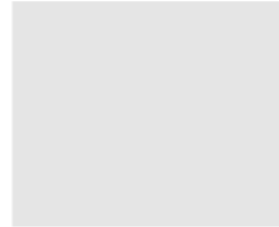
the nature of the case

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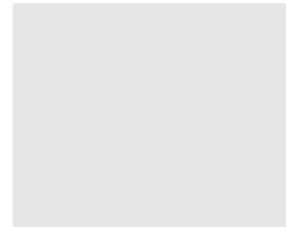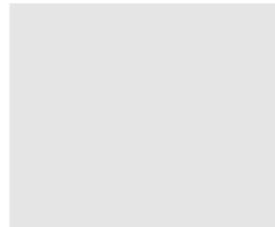
key evidence presented

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final judgment

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legal basis for the judgment

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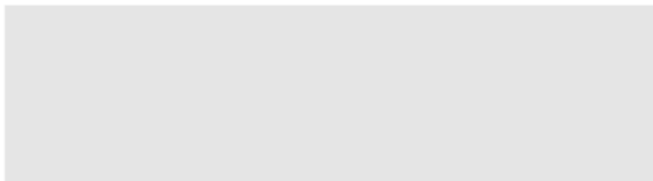
final design
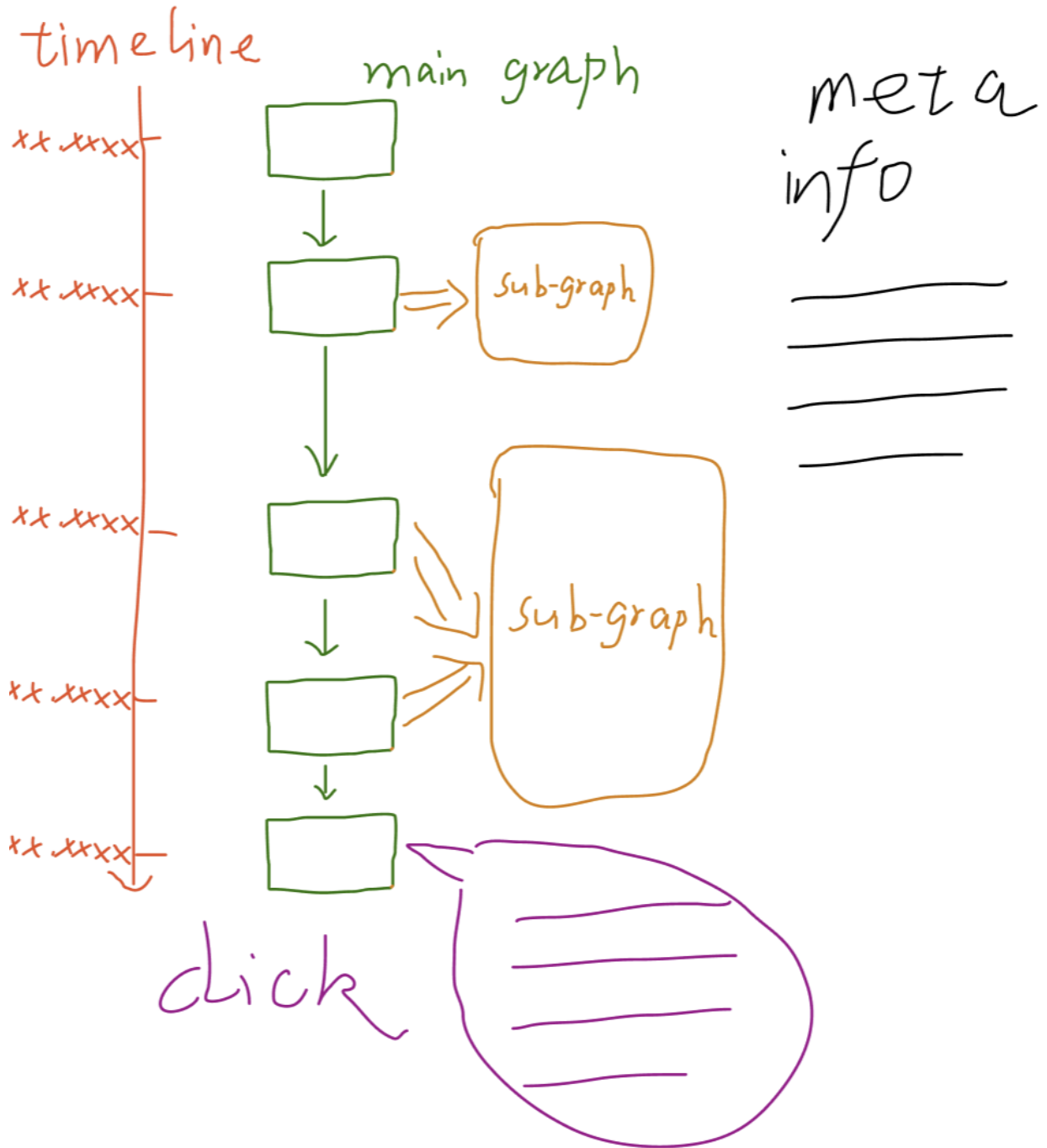
6. Justification for design

Unlike ordinary documents, legal judgments usually have a clear timeline, which is an important piece of information that we do not want to lose. A timeline visualization can clearly display the entire process from filing the case to the final judgment, facilitating people's understanding of the judgment document. Moreover, a timeline organizes events chronologically, providing a clear and straightforward visualization of the case's progression, making it easier for viewers to understand the sequence of events and their relative timing. Legal proceedings involve multiple stages, decisions, and potential outcomes. A flowchart is highly relevant as it can clearly delineate these aspects, showing the flow of the trial process. By using a hierarchical graph (main graph and sub-graph), we hope to clearly show the structure of the trial process, as well as the important details that lead to the final judgment. Adding meta information of the case will help people identify cases quickly and provide important information for the cases. To promote consistency, we plan to use consistent visual encodings on the timeline (e.g., same color and shape for all events, a consistent timeline scale) aid in the interpretation and comparison of events.

- **Must-Have Features.** Clearly shows all the key information of court documents. Including the: case background, trial record, legal basis and the reasons for the judgment. That means it will include: the timeline and its corresponding main & sub graph, as well as the meta info.

- **Optional Features.** Referencing the original text information through interactive visualization, enables interactivity in subgraphs.

7.Project Schedule.

Make sure that you plan your work so that you can avoid a big rush right before the final project deadline, and delegate different modules and responsibilities among your team members. Write this in terms of weekly deadlines.

Sep. 16 ~ Oct. 9

1. Design the prompt to get narrative representations from LLM. Obtain narrative representation.
2. Determine the final design of the website.

Oct. 10 ~ Oct. 30

1. Work on the programming for design implementation.
2. Assemble with the narrative representation obtained from LLM

Oct. 31 ~ Nov. 3

1. Finish the corresponding part of the Process Book.
2. SHould have some milestones.

Nov. 4 ~ Nov. 20

1. Finish the building of the website.

Nov. 21 ~ Nov. 31

1. Finish the entire Process Book.
2. Finish the video

8. Reference

[1] Abbott, H. Porter. *The Cambridge introduction to narrative*. Cambridge University Press, 2020.

[2] Keith Norambuena, Brian Felipe, Tanushree Mitra, and Chris North. "Mixed Multi-Model Semantic Interaction for Graph-based Narrative Visualizations." *Proceedings of the 28th International Conference on Intelligent User Interfaces*. 2023.

[3] Tom Wilson, Kaitlyn Zhou, and Kate Starbird. 2018. Assembling strategic narratives: Information operations as collaborative work within an online community. Proc. of the ACM on HCI 2, CSCW (2018), 1–26.

[4] Segel, Edward, and Jeffrey Heer. "Narrative visualization: Telling stories with data." *IEEE transactions on visualization and computer graphics* 16.6 (2010): 1139-1148.

[5] Keith Norambuena, Brian Felipe, and Tanushree Mitra. "Narrative maps: An algorithmic approach to represent and extract information narratives." *Proceedings of the ACM on Human-Computer Interaction* 4.CSCW3 (2021): 1-33.

[6]https://www.nvidia.com/en-us/glossary/data-science/large-language-models/

[7] https://en.wikipedia.org/wiki/Large_language_model

[8] https://en.wikipedia.org/wiki/Judgment_(law)