Journalist-Focused Causal Narrative Explorer that combines advanced **Causal Chain Visualization with Interactive Timelines** and **Real-Time Bias Detection**. This tool will help journalists construct, explore, and refine narratives around complex stories by understanding the causal connections between events and ensuring unbiased, objective reporting.

Complete Project Overview:

1. Project Purpose and Audience

- **Target Audience**: Journalists, news editors, and media analysts.
- **Objective**: Provide journalists with a powerful tool to accurately map complex event sequences, identify causality, and maintain neutrality in reporting.

2. Core Features

1. **Causal Chain Visualization with Interactive Timelines**
    - **Feature Overview**: An interactive timeline that shows events chronologically, highlighting causal links between them.
    - **Unique Aspects**:
        - **Dynamic Causal Editing**: Journalists can explore “what-if” scenarios by manually adjusting causal links and testing alternative narratives and scenarios to build a clear understanding of the story’s structure.
        - **Context-Enhanced Causality**: Contextual data (e.g., location, sentiment, event type) is embedded in each causal link. For instance, if an event happens in a critical area or with a specific sentiment (e.g., a protest with high public support), this context refines the causal chain, making connections more relevant.
        - **Real-Time Updates**: The tool integrates real-time data (e.g., from news APIs or social media feeds), allowing journalists to see new developments and adjust the timeline as new events unfold. This dynamic update ensures that the narrative stays current.
2. **Real-Time Bias Detection and Perspective Analysis**
    - **Feature Overview**: A real-time bias detection tool that identifies biased language, emotional tone, and framing in the text, helping journalists maintain neutrality as they write.
    - **Unique Aspects**:
        - **Interactive Bias Flagging and Suggestions**: The tool flags potentially biased language (e.g., emotionally charged words) and suggests neutral alternatives in real time, allowing journalists to refine their tone for balanced reporting.
        - **Context-Aware Bias Detection**: Beyond surface-level bias detection, this feature can pick up nuanced bias forms, such as selective emphasis or omission bias. For example, it detects if one perspective is overrepresented in a narrative and suggests balance by prompting the inclusion of missing voices.
        - **Adaptive Bias Alerts**: Journalists can customise the bias detection settings, focusing on specific bias types (e.g., political, economic)

relevant to the topic. The tool adjusts based on this input, helping journalists avoid bias specific to their reporting domain.

3. **User-Centric Visualization**
    - **Interactive Event Chains**: The tool creates visual causal graphs and timelines, helping journalists understand and convey event sequences. Each node represents an event, while arrows indicate causal links, allowing for easy navigation of complex stories.
    - **Storyline Summarization**: This feature generates concise, high-level summaries of causal chains, allowing journalists to quickly review essential events and causes, aiding in efficient reporting.

Potential Impact and Real-World Utility

- **Improved Storytelling and Insight**: The tool helps journalists understand intricate event chains and present well-researched, clear narratives to readers.
- **Enhanced Journalistic Integrity**: With real-time bias detection, journalists can produce fair, balanced reports that maintain reader trust.
- **Efficient Workflow**: Summarization and contextual cues streamline the writing process, letting journalists cover complex stories more efficiently.

Example Scenario: Reporting on an Oil Spill Incident

Input Data

The journalist has access to multiple sources of information:

1. **News Articles**: Textual reports detailing the timeline of the oil spill, the response efforts, and subsequent impact.
2. **Social Media Posts**: Public reactions, sentiment on environmental impact, and local voices.
3. **Government Reports**: Official statements on the spill's cause, impact assessments, and response efforts.
4. **Weather Data**: Relevant context, such as unusual tidal patterns, that might have affected the spill's spread.

Intermediate Steps

1. **Data Processing and Event Extraction**
    - The CNEJ tool processes all the input documents to extract relevant events, such as:
        - *Event 1*: Oil spill incident near the coast.
        - *Event 2*: Immediate wildlife deaths and environmental contamination.
        - *Event 3*: Local community protests.
        - *Event 4*: Government cleanup initiative.
        - *Event 5*: Public health warnings due to contaminated water.
2. **Temporal Event Ordering and Coreference Resolution**

    - **Temporal Ordering**: The tool arranges events chronologically based on timestamps or inferred timelines, helping the journalist see how events unfold over time.
    - **Coreference Resolution**: Ensures consistency across documents by identifying that terms like “spill,” “oil leak,” and “incident” all refer to the same event, simplifying narrative flow.
3. **Causal Chain Generation and Context-Enhanced Causality**
    - **Causal Inference**: The tool identifies causal relationships between events. For instance:
        - *Event 1* (Oil spill) → *Event 2* (Wildlife deaths)
        - *Event 1* → *Event 5* (Public health warnings)
    - **Contextual Causality**: Additional contextual factors like tidal patterns and water currents are linked to the spill's spread, adding nuance to the causality. This step lets the journalist see direct cause-and-effect pairs and contextual dependencies.
4. **Real-Time Bias Detection and Suggestions**
    - As the journalist writes, CNEJ flags potentially biased terms:
        - The term “devastating” is flagged when describing the spill. The tool suggests “significant” as a more neutral option.
        - **Omission Bias**: The tool detects an overemphasis on environmental groups’ perspectives and prompts journalists to include government and business responses to provide a balanced view.
    - **Adaptive Bias Settings**: Given the environmental theme, the tool customises bias detection to focus on ecological and health biases, helping journalists maintain neutrality.
5. **Interactive Visualization and Causal Chain Editing**
    - **Causal Graph**: The tool generates an interactive graph showing events and causal links, with nodes representing events (e.g., oil spills, protests) and edges indicating causal relations.
    - **User Interaction**: The journalist can click on nodes to view more details or adjust causal links. For instance, the journalist could examine the impact of the government response (Event 4), which had been delayed, helping them explore alternative narratives.
6. **Storyline Summarization**
    - Based on the causal chain, CNEJ generates a concise summary:
        - *“An oil spill off the coast led to immediate wildlife fatalities and environmental contamination. The spill's spread was exacerbated by high tides, affecting nearby communities and prompting public health warnings. Local protests ensued, leading to government intervention and cleanup efforts.”*
    - This summary provides a quick overview, helping the journalist frame the article before diving into details.

Output

1. **Detailed Report with Causal Insights**
    - The journalist writes an article using the insights and neutral language flagged by CNEJ, producing a balanced, causally accurate narrative:

        - *“On April 3, an oil spill occurred near Coast City due to an underwater pipeline failure. The spill quickly spread, driven by high tides, leading to wildlife fatalities and contamination of local water sources. Public health warnings were issued as residents began reporting symptoms consistent with toxic exposure. Protests by local environmental groups escalated, pressuring the government to launch a cleanup operation within days.”*
2. **Interactive Causal Timeline for Readers**
    - The journalist could use visual exports from the CNEJ tool to provide readers with an interactive timeline. This visualisation could be embedded in the digital article, allowing readers to see the event sequence and understand causality.
3. **Bias and Balance Analysis for Editorial Review**
    - The editor receives a bias report from CNEJ, summarising language neutrality and coverage balance. This report highlights sections where environmental groups and government perspectives are adequately represented, validating the article’s objectivity.

WHAT GAP AM I FILLING:

1. Unified Integration of Causal Chain Visualization and Real-Time Bias Detection

The gap in Existing Research:

- Current tools and studies primarily focus on either causal visualisation (like CausalFlow) or bias detection (like BiasScanner) independently, without combining the two into a single, cohesive tool.
- These research efforts are not designed to provide real-time interaction that adapts as a journalist builds a story or explores alternative causal paths.

Our Contribution:

- By integrating causal inference with real-time bias detection in a single platform, you provide journalists with an all-in-one tool that supports storytelling and ethical considerations. This combination directly aids journalists in constructing clear, causally accurate narratives while maintaining objectivity.
- Our tool emphasises interactivity and real-time updates, allowing journalists to adjust narratives on the fly and receive live feedback, which neither CausalFlow nor BiasScanner provides.

2. Context-Enhanced Causal Relationships with Real-Time Data

The gap in Existing Research:

- Most current causal visualisation tools, such as CausalFlow, lack **contextual enhancement** (like sentiment, location, or public sentiment) within causal chains, which are crucial for journalism. The tools generally focus on static data and lack adaptability for evolving stories.
- These tools are limited in their capability to continuously integrate **real-time data sources** (e.g., news updates, and social media), which is essential for journalists covering dynamic, ongoing stories.

Our Contribution:

- Our tool uses **context-enhanced causality** (adding sentiment, location, and entity-specific information) to allow journalists to create nuanced causal chains that better reflect real-world complexities.
- The real-time data integration capability means that as a story develops, journalists can view updated causal sequences and make changes as new events unfold—allowing for highly responsive, current reporting.

3. User Interaction with Hypothetical Scenarios and Causal Adjustments

The gap in Existing Research:

- Current research on causal visualisation generally needs more interactivity to explore hypothetical scenarios. For example, there is no mechanism to test “what-if” cases where journalists can alter an event to see how it would affect subsequent outcomes.
- Bias detection tools like BiasScanner analyse text retrospectively and are not designed for iterative, draft-stage writing, where journalists could experiment with narrative adjustments and check for bias in real time.

Our Contribution:

- **Dynamic Causal Editing**: We introduce the ability to test hypothetical scenarios where journalists can adjust or experiment with alternative causal links. This feature is precious for investigative journalism, helping reporters explore different angles and understand potential consequences.
- **Iterative Bias Feedback**: Our tool embeds real-time bias detection directly into the writing process, providing immediate, actionable suggestions. Journalists can see biases flagged as they write and receive neutral language recommendations, supporting iterative improvement as they draft.

4. Application-Specific Adaptability for Journalistic Standards

The gap in Existing Research:

- Existing tools must be specifically adapted for journalistic workflows and need settings that journalists could customise to align with different reporting standards or bias types.
- Existing research, like BiasScanner, focuses more on general bias detection rather than targeted, adaptable feedback based on specific editorial or ethical guidelines.

Our Contribution:

- **Adaptive Bias Alerts**: Journalists can customise bias detection settings according to the specific biases most relevant to their coverage (e.g., political and cultural). This flexibility is beneficial for investigative journalism, where different types of bias may be more or less relevant depending on the subject.
- **Practical Application for Newsrooms**: Your tool aligns with journalistic needs, making it useful for real-world reporting. The focus on journalistic integrity, balanced perspectives, and causal accuracy provides value academically and in professional media settings.

RESEARCH PAPERS WE WENT THROUGH:

Paper Title	Year Published	What They Are Doing	Gap our Project Fills
Once Upon A Time In Visualization: Understanding the Use of Textual Narratives for Causality	2020	Explores how textual narratives augment causality visualization, focusing on static textual explanations of causal links.	No interactivity or real-time updates for evolving stories. Lacks integration with bias detection. Your project offers interactive causal editing and combines causality with real-time bias feedback.
CausalFlow: Visual Analytics of Causality in Event Sequences	2020	Introduces a visualization tool for causality in event sequences. Focuses on static, pre-processed data to identify causal pathways.	Lacks real-time data updates, contextual enhancements (e.g., sentiment, location), and journalist-specific features. Your project provides real-time updates, contextual causality, and a journalist-centric interface.
This Media Bias Detector Analyzes News Reports in Real Time	2022	Analyzes the political leanings of major news outlets in real time. Highlights the distribution of biased viewpoints in articles.	Focuses only on political bias and not integrated into the reporting process. Your project introduces adaptive, real-time bias detection tailored to journalism workflows and

			customizable for various types of bias.
BiasScanner: Automatic Detection and Classification of News Bias to Strengthen Democracy	2024	Identifies and classifies various media bias types at the sentence level. Provides static explanations of detected biases.	Does not integrate with causal analysis or provide iterative bias feedback for story drafting. Your project embeds bias detection directly into drafting workflows and integrates it with causal storytelling.