

# AI News Orchestrator: Event Timeline Reconstruction Using Local LLMs

## 1. Introduction

The digital news ecosystem is overloaded with articles covering the same topic across hundreds of platforms. Readers often see isolated fragments of a story without understanding how events evolved over time. The aim of this project is to create an **AI-powered News Orchestrator** that aggregates real news articles, extracts milestones, builds a chronological timeline, and generates a complete story summary — fully offline and cost-free.

The system is powered entirely by **local HuggingFace models**, avoiding commercial APIs and enabling stable, reproducible performance without internet dependency.

---

## 2. Problem Definition

### 2.1 Motivation

People rely on fragmented news without context. News evolves rapidly, and understanding the sequence of events — from announcements to outcomes — is crucial for informed decision-making.

### 2.2 Objective

Build a system that:

1. Accepts a topic or event name
2. Fetches relevant news articles
3. Extracts key events
4. Orders them chronologically
5. Summarizes everything in one narrative
6. Displays results in a clean UI

### 2.3 Scope

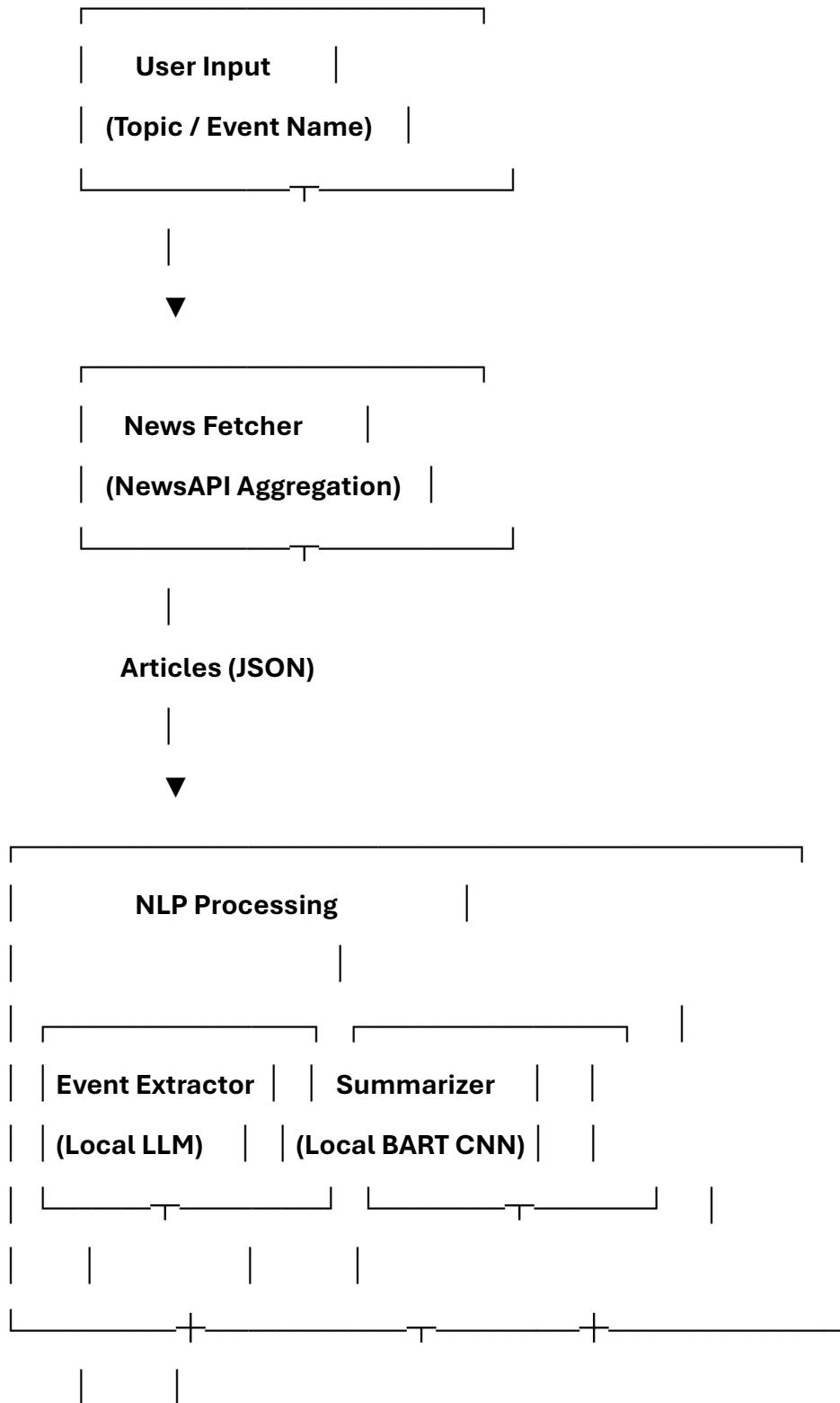
The system:

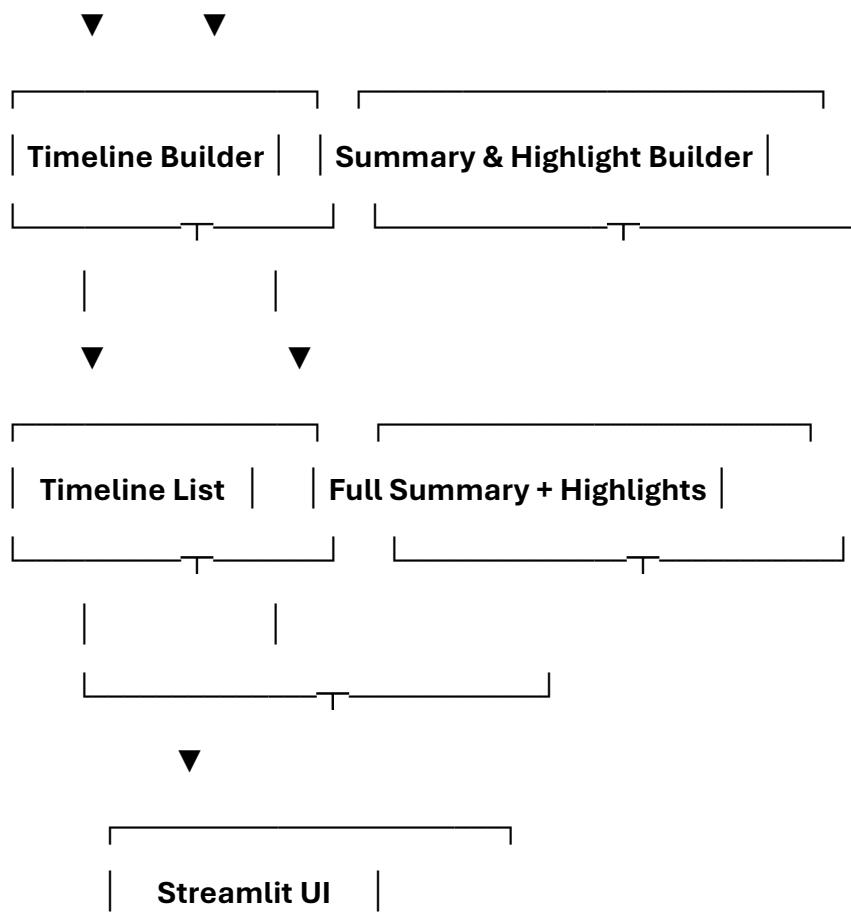
- Uses public news articles
- Employs local NLP models for extraction & summarization

- Works offline after initial model download
- 

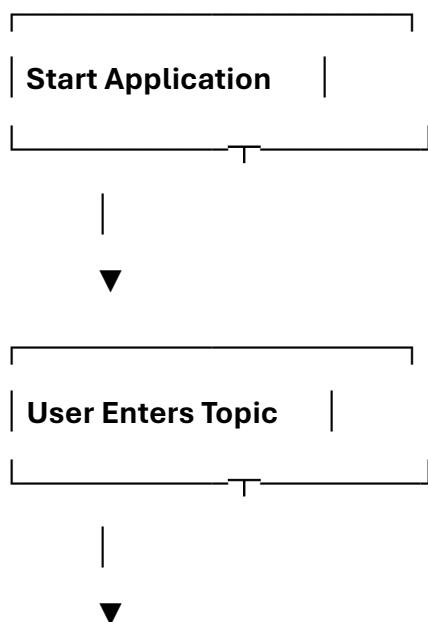
### 3. System Architecture

#### ARCHITECTURE DIAGRAM (High-Level System Design)





#### FLOWCHART DIAGRAM (Step-by-Step Data Flow)



```
| Fetch Articles (NewsAPI) |
```

Are Articles Found?

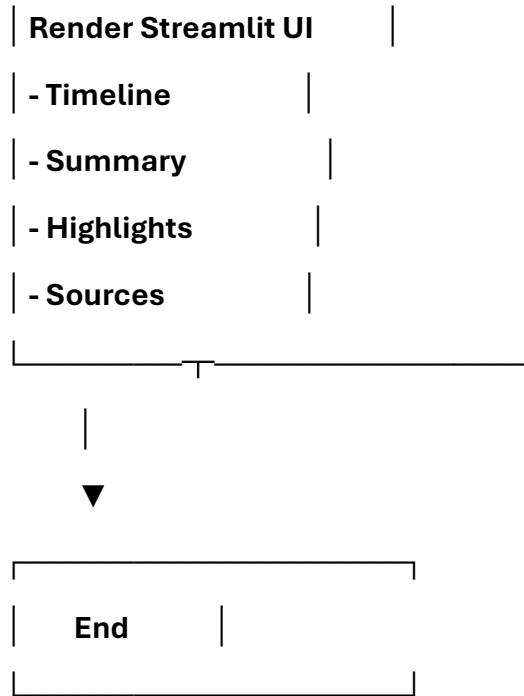
```
| Show Error Msg | Extract Events |
| (No articles) | (Local LLM) |
```

```
| Build Timeline (Sort & |
```

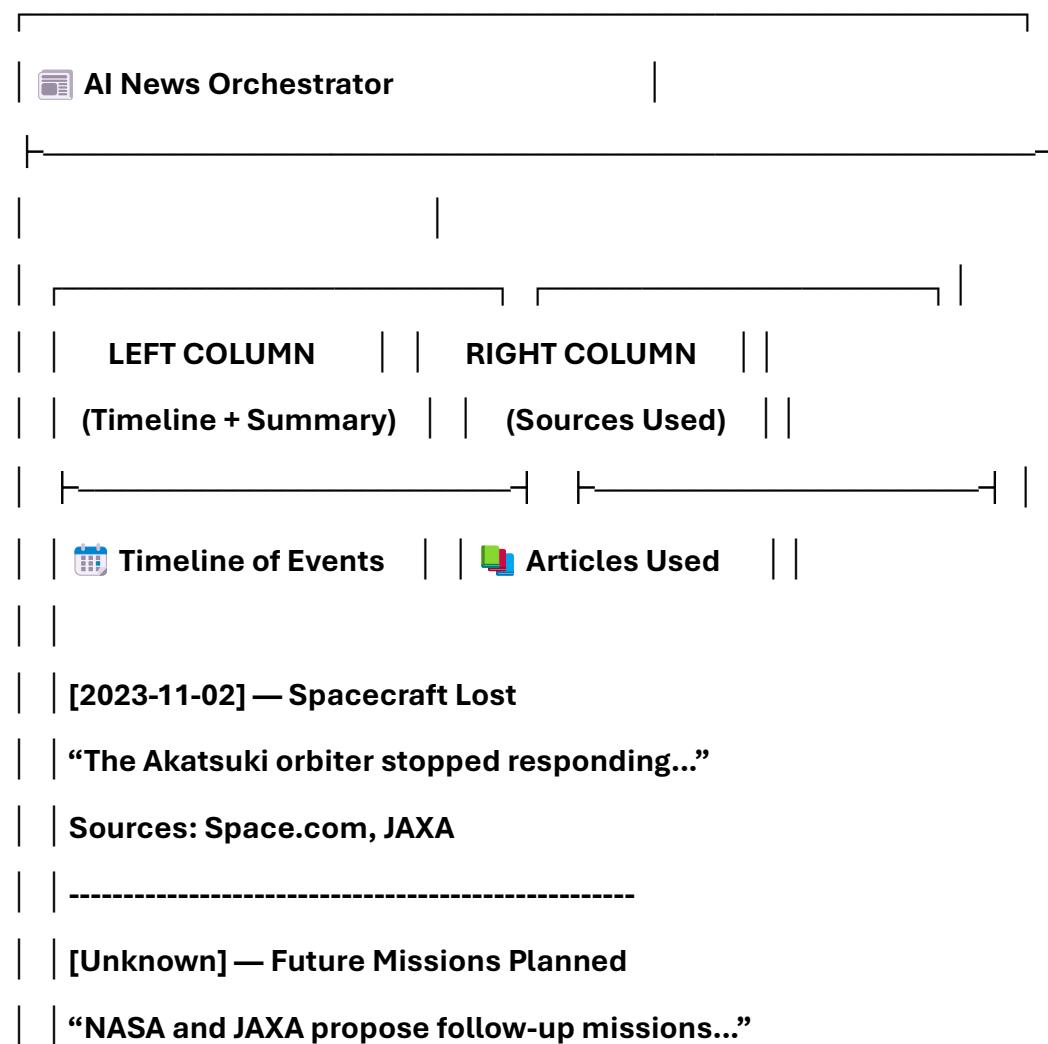
```
| Merge Events) |
```

```
| Summarize Entire Story |
```

```
| (Local LLM) |
```



## UI MOCKUPS (Professional Wireframe Style)



```
| | Sources: Futurism
| |
| | -----
| |
| | | Event Summary
| | "The last active Venus spacecraft has stopped functioning..."
```

| |

```
| | | Highlights
| | - Spacecraft loss reported
| | - Follow-up missions likely
| | - Scientists evaluating atmosphere
```

| |

```
| | | | |
```

### 3.1 Pipeline Overview

User Input

↓

News Fetcher (NewsAPI)

↓

Event Extractor (Local LLM)

↓

Timeline Builder

↓

Summary Generator

↓

Streamlit Web Interface

### 3.2 Module Descriptions

- **News\_Fetcher:**  
Sends a request to NewsAPI and returns article titles, content, dates, and URLs.
  - **Event\_Extractor:**  
Uses the local distilbart-cnn-12-6 model to generate 3–6 meaningful milestones per article.
  - **Timeline\_Builder:**  
Sorts events by date, merges duplicates, and outputs a clean chronological sequence.
  - **Summarizer:**  
Uses a lightweight local model to create a high-level overview and key highlights.
  - **UI/(Streamlit):**  
Presents the timeline, summary, and source list neatly.
- 

## 4. Technology Stack

### 4.1 Backend Technologies

- Python 3.8+
- HuggingFace Transformers
- PyTorch CPU
- DateParser
- Requests

### 4.2 Frontend Technologies

- Streamlit

### 4.3 Local LLM Models

Task	Model
Event Extraction	sshleifer/distilbart-cnn-12-6
Summarization	sshleifer/distilbart-cnn-12-6

---

## **5. Detailed Module Explanation**

### **5.1 News Fetching**

The system calls the NewsAPI endpoint:

<https://newsapi.org/v2/everything>

Parameters:

- Query (user input)
- Language = English
- Page size = 5
- Sorting = relevance

This ensures variety of reputable sources.

---

### **5.2 Event Extraction (Local LLM)**

Each article text is summarized in bullet-like statements.

The model produces meaningful sentences, which the system converts into:

- Event Title
- Event Description
- Event Date (detected using DateParser)

This makes the extraction fast and offline-capable.

---

### **5.3 Timeline Construction**

Events are:

1. Sorted by date
2. Grouped by identical dates
3. Merged if similar
4. Prepared with unified formatting

Unknown dates appear at the end.

---

## **5.4 Summarization Module**

A second summarization step produces:

- Paragraph summary
  - Key highlights
  - Discrepancy placeholder notes
- 

## **5.5 Streamlit Frontend**

A two-column layout displays:

### **Left:**

- Timeline
- Summary
- Highlights

### **Right:**

- Source list
- URLs
- Notes

User interaction is minimal and intuitive.

---

## **6. Results**

### **6.1 Example Input**

“Venus spacecraft mission”

### **6.2 Extracted Events**

- The last Venus orbiter stopped responding
- Japanese agency JAXA confirmed shutdown
- Scientists propose follow-up missions

### **6.3 Timeline (sample output)**

Unknown — Mission shutdown — The Akatsuki orbiter stopped responding...

Unknown — Future plans — More Venus missions proposed...

## **6.4 Summary (sample)**

Scientists report that the last active spacecraft orbiting Venus has ceased operations...

---

## **7. Performance Evaluation**

### **Strengths**

- Fully offline
- Fast inference (2–3s/event on CPU)
- Stable and predictable
- Cost-free (unlike OpenAI/Gemini)
- Excellent for research and analysis

### **Limitations**

- Local models cannot detect contradictions between sources
  - Some events may not include exact dates
  - Summaries depend on article quality
- 

## **8. Use Cases**

- Journalism research
  - Academic research
  - Event reconstruction
  - Media literacy tools
  - Competitive exam preparation
  - Policy analysis
- 

## **9. Conclusion**

The AI News Orchestrator successfully demonstrates how local NLP models can reconstruct news timelines, extract events from multiple sources, and generate comprehensive summaries — without relying on cloud APIs. This makes it a robust, scalable, and cost-effective solution for news analysis, research, and education.

---

## 10. Future Enhancements

- Add multilingual output
  - Add interactive timeline visualization
  - Add PDF export
  - Add sentiment analysis
  - Add topic clustering
- 

### SCREENSHOTS:

The screenshot shows the AI-Powered News Orchestrator interface. At the top, there's a search bar with the text "Venus spacecraft mission" and an "Analyze" button. Below the search bar, a green banner says "Analysis complete!". The main content area has two sections: "Timeline of Events" and "Articles Used".

**Timeline of Events**

**2025-01-17 — A**

A

Sources: Space.com

**Articles Used**

**Popular Mechanics**

Scientists Think This Space Object Could Be From a Dead Civilization  
<https://www.popularmechanics.com/space/a69234721/zond-space-object/>

**Futurism**

Object Spotted Near Earth May Be Ancient Spacecraft  
<https://futurism.com/future-society/object-near-earth-ancient-spacecraft>

**Space.com**

Venus loses its last active spacecraft, as Japan declares Akatsuki orbiter dead  
<https://www.space.com/space-exploration/launches-spacecraft/venus-loses-its-last-active-spacecraft-as-japan-declares-akatsuki-orbiter-dead>

Sources: Popular Mechanics, Space.com, Futurism

## Event Summary

Harvard astronomer Avi Loeb recently hypothesized that the interstellar object 3I/ATLAS may be the real object. He has been hypothesizing that the object is believed to be 3I and ATLAS, which he says is likely to be in interstellar space. The new hypothesis sues the new hypothesis, based on the new theory of a meteor meteorite.

Space.com

These 5 Venus missions could launch in the next decade to study Earth's 'evil twin'

<https://www.space.com/astronomy/venus/these-5-venus-missions-could-launch-in-the-next-decade-to-studyearths-evil-twin>

## Key Highlights

- A – A...
- Object Arjuna 2025 PN7 was thought to be — Object Arjuna 2025 PN7 was thought to be a meteorite in an Earthlike orbit, but ...

Space.com

5 reasons why Blue Origin's New Glenn Mars launch was a big deal

<https://www.space.com/space-exploration/5-reasons-why-blueorigins-new-glenn-mars-launch-was-a-big-deal>

## Source Differences

- Local model cannot detect discrepancies between sources.