# Supplementary Information of Wikimpacts 1.0: A new global climate impact database based on automated information extraction from Wikipedia

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## 1. 2021 EUROPEAN FLOODS

### A. 2021 European Floods deaths

**Table S1.** Deaths from the 2021 European Floods as recorded in Wikimpacts 1.0.

| | | | |
|---|---|---|---|
| **L1 Total deaths for the event** | **Administrative Areas** | | **Total Deaths** |
| | Austria, Belgium, Czech Republic, Croatia, France, Germany, Italy, Luxembourg, Netherlands, Romania, Switzerland, United Kingdom | | 243 |
| **L2 Deaths per country** | **Administrative Areas** | | |
| | Germany | | 196 |
| | Belgium | | 43 |
| | Romania | | 2 |
| | Italy | | 1 |
| | Austria | | 1 |
| **L3 Deaths per sub-national location** | **Administrative Area** | **Locations** | |
| | Germany | Rhineland-Palatinate, Ahrweiler | 135 |
| | Germany | North Rhine-Westphalia, Euskirchen | 27 |
| | Germany | Bavaria | 2 |
| | Germany | Saxony | 1 |
| | Germany | Bavaria, Berchtesgadener Ache | 1 |
| | Austria | Saalbach-Hinterglemm | 1 |
| | Belgium | Pepinster | 23 |
| | Italy | Veneto | 1 |
| | Romania | Satu Mare | 1 |
| | Romania | Iași | 1 |

### B. 2021 European Floods info_box in Wikipedia

**Listing 1.** 2021 European Floods Info_Box

```
{
  "Info_Box": "Date: 12–25 July 2021\n" +
              "Location: Austria , Belgium , Czech Republic , Croatia , " +
              "France , Germany , Italy , Luxembourg , Netherlands , " +
              "Romania , Switzerland , United Kingdom\n" +
              "Deaths: 243\n" +
              "196 in Germany\n" +
              "43 in Belgium\n" +
              "two in Romania\n" +
              "one in Italy\n" +
              "one in Austria\n" +
              "Property damage: EUR54 billion (2021 Euro)\n" +
              "200,000 properties left without power"
}
```

## 2. KEYWORDS FOR DOCUMENT SELECTION

**Table S2.** Keywords for document selection by main event category. The category Storm subsumes the more specific categories Tornado, Tropical Storm/Cyclone, and Extratropical Storm/Cyclone in the database schema.

| Category | Keywords |
|---|---|
| Drought | drought, droughts, dryness, dry spell, dry spells, rain scarcity, rain scarcities, rainfall deficit, rainfall deficits, water stress, water shortage, water shortages, water insecurity, water insecurities, limited water availability, limited water availabilities, scarce water resources, groundwater depletion, groundwater depletions, reservoir depletion, reservoir depletions |
| Extreme Temperature | heatwave, heatwaves, heat wave, heat waves, extreme heat, hot weather, high temperature, high temperatures<br><br>cold wave, cold waves, coldwave, coldwaves, cold snap, cold spell, arctic snap, low temperature, low temperatures, extreme cold, cold weather |
| Flood | floodwater, floodwaters, flood, floods, inundation, inundations, storm surge, storm surges, storm tide, storm tides |
| Wildfire | wildfire, forest fire, bushfire, wildland fire, rural fire, desert fire, grass fire, hill fire, peat fire, prairie fire, vegetation fire, veld fire |
| Storm | windstorm, windstorms, storm, storms, cyclone, cyclones, typhoon, typhoons, hurricane, hurricanes, blizzard, strong winds, low pressure, gale, gales, wind gust, wind gusts, tornado, tornadoes, wind, winds, lighting, lightings, thunderstorm, thunderstorms, hail, hails<br><br>extreme rain, extreme rains, heavy rain, heavy rains, hard rain, hard rains, torrential rain, torrential rains, extreme precipitation, extreme precipitations, heavy precipitation, heavy precipitations, torrential precipitation, torrential precipitations, cloudburst, cloudbursts |

## 3. F1 SCORE, PRECISION AND RECALL DEFINITION

In the statistical analysis of binary classification and information retrieval systems, the F-score (or F-measure) serves as a metric for evaluating predictive performance [**?** ]. It is derived from precision and recall, where precision (also known as positive predictive value) is defined as the ratio of true positive results to the total number of positive predictions (inclusive of incorrectly classified ones). Recall (or sensitivity) is calculated as the ratio of true positive results to the total number of instances that should have been classified as positive.

The F1 score represents the harmonic mean of precision and recall, providing a balanced metric of both. This can be expressed mathematically as:

$$F_1 = \frac{2}{\text{recall}^{-1} + \text{precision}^{-1}} = 2 \cdot \frac{\text{precision} \cdot \text{recall}}{\text{precision} + \text{recall}} = \frac{2\text{TP}}{2\text{TP} + \text{FP} + \text{FN}}$$

where:

- TP is the number of true positives,
- FP is the number of false positives,
- FN is the number of false negatives.

The formulas for precision and recall are as follows:

$$\text{Precision} = \frac{\text{Relevant retrieved instances}}{\text{All retrieved instances}} = \frac{\text{TP}}{\text{TP} + \text{FP}}$$

$$\text{Recall} = \frac{\text{Relevant retrieved instances}}{\text{All relevant instances}} = \frac{\text{TP}}{\text{TP} + \text{FN}}$$

The F-score ranges from 0 to 1. A value of 1.0 indicates perfect precision and recall, while a value of 0 indicates that both precision and recall are zero.

## 4. PROMPT DESIGN AND SELECTION

We develop multiple versions of prompts, and evaluate each against our gold standard data. For all cases, we set the temperature of the GPT4o model to zero. Tables S4 and S5 present the error rates for L1, L2, and L3 across various prompt versions within the development set. As shown in Table S4, the model accurately captures L1 information using both V3.1 and V3.3. Basic details like time, show error rates below 0.03 for year and month and below 0.05 for day. The error rate for the Main Event field is also less than 0.05, while for hazards it approaches 0.2. Regarding location information, prompt V3.1 yields a 0.5041 error rate in L1, while V3.2 shows an improved error rate of 0.2866. This suggests that extracting countries directly from the text outperforms retrieving affected countries from a pre-defined list. For the direct impact categories, prompt V3.1 performs well for Total Deaths and Total Insured Damage at L1, with error rates between 0.0143 and 0.0602. However, categories such as Total Buildings Damaged and Total Displaced show higher error rates, reaching 0.281 to 0.285. Categories including Total Damage, Total Injuries, Total Homeless, and Total Affected also achieve acceptable error rates at L1, ranging from 0.1184 to 0.2066. Comparative evaluation with V3.3 shows that this prompt setting has slightly lower error rates than V3.1 for certain categories, such as Main Event, Total Deaths, and Total Damage, but that it exhibits higher error rates for other impact categories. V4 maintains similar error rates to V3.1 for Total Deaths, Total Insured Damage, and Total Damage, while demonstrating marginal improvements in other categories. For V5, aside from achieving slightly lower error rates for Total Deaths and Total Damage relative to V3.1, V3.3, and V4, performance decreases across the remaining impact categories. Further, Table S5 illustrates that, on average, prompt V3.1 performs better for L2 and L3 information extraction than other prompt versions. Comparative analysis across L1, L2, and L3 evaluations reveals that placing questions prior to the article text does not optimize extraction performance for this type of data. Instead, prompts combining L1, L2, and L3-related questions provide more balanced extraction quality across impact categories. The selected full text of V3.1 and V3.2 prompts are shown in Listings 2 and 3.

**Table S3.** Description of different prompt versions tested in this study. V3.1 and V3.2 are selected for use in Wikimpacts 1.0.

| Prompt version | Description |
|---|---|
| V3.1 | Conatins all information fields (e.g, time, location, impacts). For the impact categories, all questions are combined into a single prompt. In L1, the location information is prompted to capture all affected locations. The infobox and the entire article are provided at the beginning of each prompt. |
| V3.2 | Only contains the prompt of location information in L1, which is prompted to capture all affected countries. The infobox and the entire article are provided at the beginning of each prompt. |
| V3.3 | Contains all information fields. For the impact categories, all questions are combined into a single prompt as in V3.1. The prompt of location information in L1, is prompted to capture all affected countries as in V3.2. The infobox and the entire article are provided at the end of each prompt. |
| V4 | Only contains the impact categories. L1 and L2-related questions are included in a single prompt, while L3-related questions are addressed in a separate prompt. The infobox and the entire article are provided at the beginning of each prompt. |
| V5 | Only contains the impact categories. L1, L2, and L3-related questions are addressed in three separate prompts. The infobox and the entire article are provided at the beginning of each prompt. |

**Table S4.** Mean score of each field in L1 across the different versions of the prompts. The weighted score is the average score by assigning the same weight to all the fields.

| | V3.1 | V3.2 | V3.3 | V4 | V5 |
|---|---|---|---|---|---|
| Weighted Score | 0.1204 | NA | 0.1417 | 0.1236 | 0.1563 |
| Main Event | 0.0429 | NA | 0.0286 | NA | NA |
| Hazards | 0.1833 | NA | 0.1238 | NA | NA |
| Start Date Day | 0.0286 | NA | 0.0402 | NA | NA |
| Start Date Month | 0.0143 | NA | 0.0264 | NA | NA |
| Start Date Year | 0.0143 | NA | 0.0143 | NA | NA |
| End Date Day | 0.0448 | NA | 0.0448 | NA | NA |
| End Date Month | 0.0008 | NA | 0.0008 | NA | NA |
| End Date Year | 0.0000 | NA | 0.0000 | NA | NA |
| Administrative_Areas_Norm | 0.5041 | 0.2866 | 0.4441 | NA | NA |
| Total Deaths Min | 0.0602 | NA | 0.0385 | 0.0602 | 0.0332 |
| Total Deaths Max | 0.0592 | NA | 0.0388 | 0.0592 | 0.0318 |
| Total Injuries Max | 0.1186 | NA | 0.1581 | 0.1033 | 0.2900 |
| Total Injuries Min | 0.1184 | NA | 0.1580 | 0.1033 | 0.2899 |
| Total Buildings Damaged Min | 0.2810 | NA | 0.2841 | 0.2311 | 0.2450 |
| Total Buildings Damaged Max | 0.2838 | NA | 0.2837 | 0.2265 | 0.2477 |
| Total Affected Min | 0.2002 | NA | 0.3041 | 0.2002 | 0.3389 |
| Total Affected Max | 0.2066 | NA | 0.3114 | 0.2066 | 0.3464 |
| Total Homeless Min | 0.1438 | NA | 0.2338 | 0.1300 | 0.1761 |
| Total Homeless Max | 0.1473 | NA | 0.2376 | 0.1335 | 0.1760 |
| Total Displaced Min | 0.2850 | NA | 0.4152 | 0.2707 | 0.3736 |
| Total Displaced Max | 0.2818 | NA | 0.4059 | 0.2675 | 0.3643 |
| Total Damage Min | 0.1244 | NA | 0.1115 | 0.1244 | 0.0958 |
| Total Damage Max | 0.1163 | NA | 0.1022 | 0.1164 | 0.0878 |
| Total Damage Unit | 0.0857 | NA | 0.0857 | 0.0857 | 0.0714 |
| Total Damage Inflation Adjusted | 0.1571 | NA | 0.1429 | 0.1571 | 0.1000 |
| Total Damage Inflation Adjusted Year | 0.0286 | NA | 0.0143 | 0.0429 | 0.0286 |
| Total Insured Damage Min | 0.0429 | NA | 0.0714 | 0.0429 | 0.0286 |
| Total Insured Damage Max | 0.0429 | NA | 0.0714 | 0.0429 | 0.0286 |
| Total Insured Damage Unit | 0.0286 | NA | 0.0714 | 0.0286 | 0.0143 |
| Total Insured Damage Inflation Adjusted | 0.0714 | NA | 0.1143 | 0.0714 | 0.0571 |
| Total Insured Damage Inflation Adjusted Year | 0.0143 | NA | 0.0143 | 0.0143 | 0.0143 |

**Table S5.** Weighted scores (same definition as Table **??**) for each impact category in L2 and L3 across different versions of the prompts. V3.2 is not included since the impact prompts are the same as in V3.1. "Average" is the mean value of all weighted scores in each column.

| | **V3.1** | | **V3.3** | | **V4** | | **V5** | |
|---|---|---|---|---|---|---|---|---|
| | L2 | L3 | L2 | L3 | L2 | L3 | L2 | L3 |
| Deaths | 0.5283 | 0.6438 | 0.581671 | 0.6115 | 0.5094 | 0.5835 | 0.5433 | 0.6026 |
| Injuries | 0.3141 | 0.4718 | 0.395199 | 0.5134 | 0.3904 | 0.6098 | 0.4661 | 0.5900 |
| Homeless | 0.3743 | 0.4849 | 0.372344 | 0.4561 | 0.4944 | 0.5583 | 0.5230 | 0.5420 |
| Displaced | 0.3632 | 0.4494 | 0.395024 | 0.5121 | 0.3739 | 0.4902 | 0.5164 | 0.4699 |
| Affected | 0.4641 | 0.5297 | 0.519331 | 0.5123 | 0.5997 | 0.5284 | 0.6828 | 0.5540 |
| Buildings_Damaged | 0.5410 | 0.5956 | 0.539552 | 0.5498 | 0.6669 | 0.5572 | 0.6890 | 0.6113 |
| Insured_Damage | NA | 0.5052 | NA | 0.5944 | NA | 0.5200 | NA | 0.5267 |
| Damage | 0.4537 | 0.4964 | 0.436760 | 0.4553 | 0.5340 | 0.5862 | 0.5759 | 0.5227 |
| Average | 0.4341 | 0.5221 | 0.4628 | 0.5256 | 0.5098 | 0.5542 | 0.5709 | 0.5524 |

**Listing 2.** The full text of V3.1 prompts

```
V3.1 prompts = {
"affected": [
    """Based on information box {Info_Box} and header−content pair article {Whole_Text},
  extract the number of affected people associated with the {Event_Name}, along with
      supporting annotations from the article.
  The affected people information can be splited into 3 parts,
  the first is the total number of affected people caused by the {Event_Name}, and
      organize this information in JSON format as follows:
  − "Total_Summary_Affected":{{
  − "Total_Affected": "The total number of people who were affected, impacted, or
      influenced in the {Event_Name}.
    Use the exact number if mentioned, or retain the text or range as provided for vague
        numbers (e.g., 'hundreds of,' '500 families,' 'at least 200', '300−500 people').
    Do not sum the number of affected people in the article to present the total number of
        affected people,
    and if no total number of affected people explicitly mentioned or the information is
        missing, assign 'NULL'."
  − "Total_Affected_Annotation": "Cite "Info_Box" or the header name from the article
      provided where you find the information about the total affected people. The
      output should only include "Info_Box" or the header name."
  }}
  the second is the total number of affected people in the country level caused by the
      {Event_Name}, and organize this information in JSON format as follows:
  − "Instance_Per_Administrative_Areas_Affected":[{{
  − "Administrative_Areas": "Name of the country where the affected people located, and
      no matter the affected people are in one or several countries, please order them in a
      list like [Country1, Country2, Country3]."
  − "Start_Date": "The start date when the people were affected, if mentioned."
  − "End_Date":"The end date when the people were affected, if mentioned."
  − "Num": "The total number of people who were affected, impacted, or influenced in this
      level related to the {Event_Name}.
    Do not sum the number of affected people in specific locations from the country to
        present the total number of affected people for this level information.
    Use the exact number if mentioned, or retain the text or range as provided for vague
        numbers (e.g., 'hundreds of,' '500 families,' 'at least 200', '300−500 people').
    If the information is missing or if no total number of affected people in this level is
        mentioned, assign 'NULL'."
  − "Annotation": "Cite the header name from the article provided where you find the
      information about the total affected people in this level. The output should only
      include the header name."
       }}]
  the third is the specific instance of affected people in the sub−national level caused by
      the {Event_Name}, make sure to capture all locations with affected people
      information and organize this information in JSON format as follows:
  − "Specific_Instance_Per_Administrative_Area_Affected":[{{
  − "Administrative_Area": "Name of the country."
  − "Locations": "The specific place within the country where the affected people located,
      and no matter the affected people are in one or several places, order them in a list
      like ["Location1";"Location2";"Location3"]."
  − "Start_Date": "The start date when the people were affected, if mentioned."
  − "End_Date":"The end date when the people were affected, if mentioned."
  − "Num": "The number of people who were affected, impacted, or influenced in the
      specific location/locations related to the {Event_Name}.
    Use the exact number if mentioned, or retain the text or range as provided for vague
        numbers (e.g., 'hundreds of,' '500 families,' 'at least 200', '300−500 people').
    If the information is missing, assign 'NULL'."
```

– "Annotation": "Cite the header name from the article provided where you find the information about the affected people in this location. The output should only include the header name."
}}]
Ensure to capture all instances of affected people mentioned in the article, including direct and indirect causes. Only Give Json output, no extra explanation needed. """
],
"buildings_damaged": [
"""Based on information box {Info_Box} and header−content pair article {Whole_Text},
extract the number of damaged buildings associated with the {Event_Name},
covering a wide range of building types such as structures, homes, houses, households, apartments, office buildings, retail stores, hotels, schools, hospitals, and more,
along with supporting annotations from the article. The number of damaged buildings information can be splited into 3 parts,
the first is the total number of damaged buildings caused by the {Event_Name}, and organize this information in JSON format as follows:
– "Total_Summary_Buildings_Damaged":{{
– "Total_Buildings_Damaged": "The total number of damaged buildings in the {Event_Name}.
Use the exact number if mentioned, or retain the text or range as provided for vague numbers (e.g., "hundreds of, "few houses", "several homes").
Do not sum the number of damaged buildings in the article to present the total number of damaged buildings,
and if no total number of damaged buildings explicitly mentioned or the information is missing, assign 'NULL'."
– "Total_Buildings_Damaged_Annotation": "Cite "Info_Box" or the header name from the article provided where you find the information about the total number of damaged buildings. The output should only include "Info_Box" or the header name."
}}
the second is the total number of damaged buildings in the country level caused by the {Event_Name}, and organize this information in JSON format as follows:
– "Instance_Per_Administrative_Areas_Buildings_Damaged":[{{
– "Administrative_Areas": "Name of the country where the building damage occured, and no matter the building damage is in one or several countries, please order them in a list like [Country1, Country2, Country3].."
– "Start_Date": "The start date when the damaged buildings occurred, if mentioned."
– "End_Date":"The end date when the damaged buildings occurred, if mentioned."
– "Num": ""The total number of damaged buildings in this level related to the {Event_Name}.
Do not sum the number of damaged buildings in specific locations from the country to present the total number of damaged buildings for this level information.
Use the exact number if mentioned, or retain the text or range as provided for vague numbers (e.g., "hundreds of, "few houses", "several homes").
If the information is missing or if no total number of damaged buildings in this level is mentioned, assign 'NULL'."
– "Annotation": "Cite the header name from the article provided where you find the information about the total building damage in this level. The output should only include the header name."
}}]
the third is the specific instance of damaged buildings within each country caused by the {Event_Name}, make sure to capture all locations with damaged buildings information and organize this information in JSON format as follows:
– "Specific_Instance_Per_Administrative_Area_Buildings_Damaged":[{{
– "Administrative_Area": "Name of the country."
– "Locations": "The specific place/places within the country where the damaged buildings occurred, and no matter the building damage is in one or several places, order it/them in a list like ["city1";"city2";"city3"]."
– "Start_Date": "The start date when the damaged buildings occurred, if mentioned."

– "End_Date":"The end date when the damaged buildings occurred, if mentioned."
– "Num": "The number of damaged buildings in the specific location/locations related to the {Event_Name}.
Use the exact number if mentioned, or retain the text or range as provided for vague numbers (e.g., "hundreds of, "few houses", "several homes"). If the information is missing, assign 'NULL'."
– "Annotation": "Cite the header name from the article provided where you find the information about the building damage in this location. The output should only include the header name."
}}]
Ensure to capture all instances of damaged buildings mentioned in the article, including direct and indirect causes. Only Give Json output, no extra explanation needed. """
],
"deaths": [
"""Based on information box {Info_Box} and header−content pair article {Whole_Text}, extract the number of deaths associated with the {Event_Name},
along with supporting annotations from the article. The death information can be splited into 3 parts,
the first is the total number of deaths caused by the {Event_Name}, and organize this information in JSON format as follows:
– "Total_Summary_Deaths":{{
– "Total_Deaths": "The total number of people who died in the {Event_Name}.
Use the exact number if mentioned, or retain the text or range as provided for vague numbers (e.g., 'hundreds of,' '500 families,' 'at least 200', '300−500 people').
Do not sum the number of death in the article to present the total number of death, and if no total number of death explicitly mentioned or the information is missing, assign 'NULL'."
– "Total_Deaths_Annotation": "Cite "Info_Box" or the header name from the article provided where you find the information about the total death. The output should only include "Info_Box" or the header name."
}}
the second is the total number of deaths in the country level caused by the {Event_Name}, and organize this information in JSON format as follows:
– "Instance_Per_Administrative_Areas_Deaths":[{{
– "Administrative_Areas": "Name of the country where the death occurred, and no matter the deaths are in one or several countries, please order them in a list like [Country1, Country2, Country3]."
– "Start_Date": "The start date when the deaths occurred, if mentioned."
– "End_Date":"The end date when the deaths occurred, if mentioned."
– "Num": "The total number of people who died in this level related to the {Event_Name}.
Do not sum the number of death in specific locations from the country to present the total number of death for this level information.
Use the exact number if mentioned, or retain the text or range as provided for vague numbers (e.g., 'hundreds of,' '500 families,' 'at least 200', '300−500 people').
If the information is missing or if no total number of death in this level is mentioned, assign 'NULL'."
– "Annotation": "Cite the header name from the article provided where you find the information about the total death in this level. The output should only include the header name."
}}]
the third is the specific instance of deaths in the sub−national level caused by the {Event_Name}, make sure to capture all locations with death information and organize this information in JSON format as follows:
– "Specific_Instance_Per_Administrative_Area_Deaths":[{{
– "Administrative_Area": "Name of the country."
– "Locations": "The specific place within the country where the deaths occurred, and no matter the deaths are in one or several places, order them in a list like ["Location1";"Location2";"Location3"]."

– "Start_Date": "The start date when the deaths occurred, if mentioned."
– "End_Date":"The end date when the deaths occurred, if mentioned."
– "Num": "The number of people who died in the specific location/locations related to the {Event_Name}.
Use the exact number if mentioned, or retain the text or range as provided for vague numbers (e.g., 'hundreds of,' '500 families,' 'at least 200', '300−500 people'). If the information is missing, assign 'NULL'."
– "Annotation": "Cite the header name from the article provided where you find the information about the death in this location. The output should only include the header name."
}}]
Ensure to capture all instances of death mentioned in the article, including direct and indirect causes. Only Give Json output, no extra explanation needed. """
],
"displaced": [
"""Based on information box {Info_Box} and header−content pair article {Whole_Text},
extract the number of displacement associated with the {Event_Name}, along with supporting annotations from the article.
The displacement information can be splited into 3 parts,
the first is the total number of displacement caused by the {Event_Name}, and organize this information in JSON format as follows:
– "Total_Summary_Displaced":{{
– "Total_Displaced": "The total number of people who were displaced, evacuated, transfered/moved to the shelter, relocated or fleed in the {Event_Name}.
Use the exact number if mentioned, or retain the text or range as provided for vague numbers (e.g., 'hundreds of,' '500 families,' 'at least 200', '300−500 people').
Do not sum the number of displacement in the article to present the total number of displacement,
and if no total number of displacement explicitly mentioned or the information is missing, assign 'NULL'."
– "Total_Displaced_Annotation": "Cite "Info_Box" or the header name from the article provided where you find the information about the total displacement. The output should only include "Info_Box" or the header name."
}}
the second is the total number of displacement in the country level caused by the {Event_Name}, and organize this information in JSON format as follows:
– "Instance_Per_Administrative_Areas_Displaced":[{{
– "Administrative_Areas": "Name of the country where the displacement occurred, and no matter the displacement is in one or several countries, please order them in a list like [Country1, Country2, Country3]."
– "Start_Date": "The start date when the displacement occurred, if mentioned."
– "End_Date":"The end date when the displacement occurred, if mentioned."
– "Num": "The total number of people who were displaced, evacuated, transfered/moved to the shelter, relocated or fleed in this level related to the {Event_Name}.
Do not sum the number of displacement in specific locations from the country to present the total number of displacement for this level information.
Use the exact number if mentioned, or retain the text or range as provided for vague numbers (e.g., 'hundreds of,' '500 families,' 'at least 200', '300−500 people').
If the information is missing or if no total number of displacement in this level is mentioned, assign 'NULL'."
– "Annotation": "Cite the header name from the article provided where you find the information about the total displacement in this level. The output should only include the header name."
}}]
the third is the specific instance of displacement in the sub−national level caused by the {Event_Name}, make sure to capture all locations with displacement information and organize this information in JSON format as follows:
– "Specific_Instance_Per_Administrative_Area_Displaced":[{{

– "Administrative_Area": "Name of the country."
– "Locations": "The specific place within the country where the displacement occurred, and no matter the displacement is in one or several places, order them in a list like ["Location1";"Location2";"Location3"]."
– "Start_Date": "The start date when the displacement occurred, if mentioned."
– "End_Date":"The end date when the displacement occurred, if mentioned."
– "Num": "The number of people who were displaced, evacuated, transfered/moved to the shelter, relocated or fleed in the specific location/locations related to the {Event_Name}.
Use the exact number if mentioned, or retain the text or range as provided for vague numbers (e.g., 'hundreds of,' '500 families,' 'at least 200', '300–500 people'). If the information is missing, assign 'NULL'."
– "Annotation": "Cite the header name from the article provided where you find the information about the displacement in this location. The output should only include the header name."
}}]
Ensure to capture all instances of displacement mentioned in the article, including direct and indirect causes. Only Give Json output, no extra explanation needed. """
],
"homeless": [
"""Based on information box {Info_Box} and header–content pair article {Whole_Text}, extract the number of homelessness associated with the {Event_Name}, along with supporting annotations from the article.
The homelessness information can be splited into 3 parts,
the first is the total number of homelessness caused by the {Event_Name}, and organize this information in JSON format as follows:
– "Total_Summary_Homeless":{{
– "Total_Homeless": "The total number of people who were homeless, lost their homes, experienced house damage, had their homes destroyed, were unhoused, without shelter, houseless, or shelterless in the {Event_Name}.
Use the exact number if mentioned, or retain the text or range as provided for vague numbers (e.g., 'hundreds of,' '500 families,' 'at least 200', '300–500 people').
Do not sum the number of homelessness in the article to present the total number of homelessness,
and if no total number of homelessness explicitly mentioned or the information is missing, assign 'NULL'."
– "Total_Homeless_Annotation": "Cite "Info_Box" or the header name from the article provided where you find the information about the total homelessness. The output should only include "Info_Box" or the header name."
}}
the second is the total number of homelessness in the country level caused by the {Event_Name}, and organize this information in JSON format as follows:
– "Instance_Per_Administrative_Areas_Homeless":[{{
– "Administrative_Areas": "Name of the country where the homelessness occurred, and no matter the homelessness is in one or several countries, please order them in a list like [Country1, Country2, Country3]."
– "Start_Date": "The start date when the homelessness occurred, if mentioned."
– "End_Date":"The end date when the homelessness occurred, if mentioned."
– "Num": "The total number of people who were homeless, lost their homes, experienced house damage, had their homes destroyed, were unhoused, without shelter, houseless, or shelterless in this level related to the {Event_Name}.
Do not sum the number of homelessness in specific locations from the country to present the total number of homelessness for this level information.
Use the exact number if mentioned, or retain the text or range as provided for vague numbers (e.g., 'hundreds of,' '500 families,' 'at least 200', '300–500 people').
If the information is missing or if no total number of homelessness in this level is mentioned, assign 'NULL'."
– "Annotation": "Cite the header name from the article provided where you find the information about the total homelessness in this level. The output should only

include the header name."
}}]
the third is the specific instance of homelessness in the sub−national level caused by the {Event_Name}, make sure to capture all locations with homelessness information and organize this information in JSON format as follows:
− "Specific_Instance_Per_Administrative_Area_Homeless":[{{
− "Administrative_Area": "Name of the country."
− "Locations": "The specific place within the country where the homelessness occurred, and no matter the homelessness is in one or several places, order them in a list like ["Location1";"Location2";"Location3"]."
− "Start_Date": "The start date when the homelessness occurred, if mentioned."
− "End_Date":"The end date when the homelessness occurred, if mentioned."
− "Num": "The number of people who were homeless, lost their homes, experienced house damage, had their homes destroyed, were unhoused, without shelter, houseless, or shelterless in the specific location/locations related to the {Event_Name}.
Use the exact number if mentioned, or retain the text or range as provided for vague numbers (e.g., 'hundreds of,' '500 families,' 'at least 200', '300−500 people'). If the information is missing, assign 'NULL'."
− "Annotation": "Cite the header name from the article provided where you find the information about the homelessness in this location. The output should only include the header name."
}}]
Ensure to capture all instances of homelessness mentioned in the article, including direct and indirect causes. Only Give Json output, no extra explanation needed. """
],
"injuries": [
"""Based on information box {Info_Box} and header−content pair article {Whole_Text}, extract the number of non−fatal injuries associated with the {Event_Name}, along with supporting annotations from the article.
The non−fatal injuries information can be splited into 3 parts,
the first is the total number of non−fatal injuries caused by the {Event_Name}, and organize this information in JSON format as follows:
− "Total_Summary_Injuries":{{
− "Total_Injuries": "The total number of people who got injured, hurt, wound, or hospitalized (excluding death) in the {Event_Name}.
Use the exact number if mentioned, or retain the text or range as provided for vague numbers (e.g., 'hundreds of,' '500 families,' 'at least 200', '300−500 people').
Do not sum the number of non−fatal injuries in the article to present the total number of non−fatal injuries,
and if no total number of non−fatal injuries explicitly mentioned or the information is missing, assign 'NULL'."
− "Total_Injuries_Annotation": "Cite "Info_Box" or the header name from the article provided where you find the information about the total non−fatal injuries. The output should only include "Info_Box" or the header name."
}}
the second is the total number of non−fatal injuries in the country level caused by the {Event_Name}, and organize this information in JSON format as follows:
− "Instance_Per_Administrative_Areas_Injuries":[{{
− "Administrative_Areas": "Name of the country where the non−fatal injuries occurred, and no matter the non−fatal injuries are in one or several countries, please order them in a list like [Country1, Country2, Country3]."
− "Start_Date": "The start date when the non−fatal injuries occurred, if mentioned."
− "End_Date":"The end date when the non−fatal injuries occurred, if mentioned."
− "Num": "The total number of people who got injured, hurt, wound, or hospitalized (excluding death) in this level related to the {Event_Name}.
Do not sum the number of non−fatal injuries in specific locations from the country to present the total number of non−fatal injuries for this level information.

Use the exact number if mentioned, or retain the text or range as provided for vague numbers (e.g., 'hundreds of,' '500 families,' 'at least 200', '300–500 people').
If the information is missing or if no total number of non–fatal injuries in this level is mentioned, assign 'NULL'."
– "Annotation": "Cite the header name from the article provided where you find the information about the total non–fatal injuries in this level. The output should only include the header name."
}}]
the third is the specific instance of non–fatal injuries in the sub–national level caused by the {Event_Name}, make sure to capture all locations with non–fatal injuries information and organize this information in JSON format as follows:
– "Specific_Instance_Per_Administrative_Area_Injuries":[{{
– "Administrative_Area": "Name of the country."
– "Locations": "The specific place within the country where the non–fatal injuries occurred, and no matter the non–fatal injuries are in one or several places, order them in a list like ["Location1";"Location2";"Location3"]."
– "Start_Date": "The start date when the non–fatal injuries occurred, if mentioned."
– "End_Date":"The end date when the non–fatal injuries occurred, if mentioned."
– "Num": "The number of people who got injured, hurt, wound, or hospitalized (excluding death) in the specific location/locations related to the {Event_Name}.
Use the exact number if mentioned, or retain the text or range as provided for vague numbers (e.g., 'hundreds of,' '500 families,' 'at least 200', '300–500 people'). If the information is missing, assign 'NULL'."
– "Annotation": "Cite the header name from the article provided where you find the information about the non–fatal injuries in this location. The output should only include the header name."
}}]
Ensure to capture all instances of non–fatal injuries mentioned in the article, including direct and indirect causes. Only Give Json output, no extra explanation needed. """
],
"insured_damage": [
"""
Based on information box {Info_Box} and header–content pair article {Whole_Text},
extract the insured damage information associated with the {Event_Name}, along with supporting annotations from the article.
The insured damage information can be splited into 3 parts,
the first is the total insured damage caused by the {Event_Name}, including damage or loss to property, belongings, or persons covered under the terms of an insurance policy,
and organize this information in JSON format as follows:
– "Total_Summary_Insured_Damage": {{
– "Total_Insured_Damage": "The total amount of insured damage and make sure the information extracted for this containing the keyword "insured" or "insurance".
Use the exact number if mentioned, or retain the text or range as provided for vague numbers (e.g., 'hundred million,''several billion', "minimal").
Do not sum the number of insured damage in the article to present the total number of insured damage,
and if no total number of insured damage explicitly mentioned or the information is missing, assign 'NULL'."
– "Total_Insured_Damage_Unit": "The currency of the total insured damage, like USD, EUR; If Total_Insured_Damage is missing from the previous step, assign 'NULL'."
– "Total_Insured_Damage_Inflation_Adjusted": "Indicate 'Yes' if the total insured damage amount has been adjusted for inflation; otherwise "No", If Total_Insured_Damage is missing from the previous step, assign 'NULL'."
– "Total_Insured_Damage_Inflation_Adjusted_Year": "The year of inflation adjustment for the total insured damage, if applicable; If

Total_Insured_Damage is missing from the previous step, assign 'NULL'."
– "Total_Insured_Damage_Annotation": "Cite "Info_Box" or the header name from the article provided where you find the information about the total insured damage. The output should only include "Info_Box" or the header name."
}}
the second is the total insured damage in the country level caused by the {Event_Name}, and organize this information in JSON format as follows:
– "Instance_Per_Administrative_Areas_Insured_Damage":[{{
– "Administrative_Areas": "Name of the country where the insured damage occured, and no matter the total insured damage is in one or several countries, please order them in a list like [Country1, Country2, Country3]."
– "Start_Date": "The start date when the insured damage occurred, if mentioned."
– "End_Date":"The end date when the insured damage occurred, if mentioned."
– "Num": "The total amount of insured damage in this level related to the {Event_Name} and make sure the information extracted for this containing the keyword "insured" or "insurance".
Do not sum the insured damage in specific locations from the country to present the total insured damage for this level information.
Use the exact number if mentioned, or retain the text or range as provided for vague numbers (e.g., 'hundred million,''several billion').
If the information is missing or if no total insured damage in this level is mentioned, assign 'NULL'."
– "Num_Unit": "The currency of the total insured damage, like USD, EUR; If Total_Insured_Damage is missing from the previous step, assign 'NULL'."
– "Num_Inflation_Adjusted": "Indicate 'Yes' if the total insured damage amount has been adjusted for inflation; otherwise "No", and if Total_Insured_Damage is missing from the previous step, assign 'NULL'."
– "Num_Inflation_Adjusted_Year": "The year of inflation adjustment for the total insured damage, if applicable; If Total_Insured_Damage is missing from the previous step, assign 'NULL'."
– "Annotation": "Cite the header name from the article provided where you find the information about the total insured damage in this level. The output should only include the header name."
}}]
the third is the specific instance of insured damage in the sub−national level caused by the {Event_Name}, make sure to capture all locations with insured damage information and organize this information in JSON format as follows:
– "Specific_Instance_Per_Administrative_Area_Insured_Damage":[{{
– "Administrative_Area": "Name of the country."
– "Locations": "The specific place/places within the country where the insured damage occurred, and no matter the insured damage is in one or several places, order it/them in a list like ["Location1";"Location2";"Location3"]."
– "Start_Date": "The start date when the insured damage occurred, if mentioned."
– "End_Date":"The end date when the insured damage occurred, if mentioned."
– "Num": "The amount of insured damage in the specific location/locations related to the {Event_Name} and make sure the information extracted for this containing the keyword "insured" or "insurance".
Use the exact number if mentioned, or retain the text or range as provided for vague numbers (e.g., 'hundred million,''several billion'). If the information is missing, assign 'NULL'."
– "Num_Unit": "The currency of the insured damage, like USD, EUR. If Insured_Damage is missing from the previous step, assign 'NULL'."
– "Num_Inflation_Adjusted": "Indicate 'Yes' if the insured damage amount has been adjusted for inflation; otherwise "No", If Insured_Damage is missing from the previous step, assign 'NULL'."

– "Num_Inflation_Adjusted_Year": "The year of inflation adjustment for the insured damage, if applicable; If Insured_Damage is missing from the previous step, assign 'NULL'."
– "Annotation": "Cite the header name from the article provided where you find the information about the insured damage in this location. The output should only include the header name."

}}]
Ensure to capture all instances of insured damage mentioned in the article, including direct and indirect causes. Only Give Json output, no extra explanation needed. """
],
"damage": [
"""
Based on information box {Info_Box} and header−content pair article {Whole_Text},
extract the economic damage information associated with the {Event_Name}, along with supporting annotations from the article.
The economic damage information can be splited into 3 parts,
the first is the total economic damage caused by the {Event_Name},
and organize this information in JSON format as follows:
– "Total_Summary_Damage": {{
– "Total_Damage": "The total amount of economic damage.
Use the exact number if mentioned, or retain the text or range as provided for vague numbers (e.g., 'hundred million,''several billion', "minimal").
Do not sum the number of economic damage in the article to present the total number of economic damage,
and if no total number of economic damage explicitly mentioned or the information is missing, assign 'NULL'."
– "Total_Damage_Unit": "The currency of the total economic damage, like USD, EUR; If Total_Economic_Damage is missing from the previous step, assign 'NULL'."
– "Total_Damage_Inflation_Adjusted": "Indicate 'Yes' if the total economic damage amount has been adjusted for inflation; otherwise "No", If Total_Economic_Damage is missing from the previous step, assign 'NULL'."
– "Total_Damage_Inflation_Adjusted_Year": "The year of inflation adjustment for the total economic damage, if applicable; If Total_Economic_Damage is missing from the previous step, assign 'NULL'."
– "Total_Damage_Annotation": "Cite "Info_Box" or the header name from the article provided where you find the information about the total economic damage. The output should only include "Info_Box" or the header name."
}}
the second is the total economic damage in the country level caused by the {Event_Name}, and organize this information in JSON format as follows:
– "Instance_Per_Administrative_Areas_Damage":[{{
– "Administrative_Areas": "Name of the country where the economic damage occured, and no matter the total economic damage is in one or several countries, please order them in a list like [Country1, Country2, Country3]."
– "Start_Date": "The start date when the economic damage occurred, if mentioned."
– "End_Date":"The end date when the economic damage occurred, if mentioned."
– "Num": "The total amount of economic damage in this level related to the {Event_Name}.
Do not sum the economic damage in specific locations from the country to present the total economic damage for this level information.
Use the exact number if mentioned, or retain the text or range as provided for vague numbers (e.g., 'hundred million,''several billion').

If the information is missing or if no total economic damage in this level is mentioned, assign 'NULL'."
– "Num_Unit": "The currency of the total economic damage, like USD, EUR; If Total_Economic_Damage is missing from the previous step, assign 'NULL'."
– "Num_Inflation_Adjusted": "Indicate 'Yes' if the total economic damage amount has been adjusted for inflation; otherwise "No", and if Total_Economic_Damage is missing from the previous step, assign 'NULL'."
– "Num_Inflation_Adjusted_Year": "The year of inflation adjustment for the total economic damage, if applicable; If Total_Economic_Damage is missing from the previous step, assign 'NULL'."
– "Annotation": "Cite the header name from the article provided where you find the information about the total economic damage in this level. The output should only include the header name."
}}]
the third is the specific instance of economic damage in the sub−national level caused by the {Event_Name}, make sure to capture all locations with economic damage information and organize this information in JSON format as follows:
– "Specific_Instance_Per_Administrative_Area_Damage":[{{
– "Administrative_Area": "Name of the country."
– "Locations": "The specific place/places within the country where the economic damage occurred, and no matter the economic damage is in one or several places, order it/them in a list like ["Location1";"Location2";"Location3"]."
– "Start_Date": "The start date when the economic damage occurred, if mentioned."
– "End_Date":"The end date when the economic damage occurred, if mentioned."
– "Num": "The amount of economic damage in the specific location/locations related to the {Event_Name}.
Use the exact number if mentioned, or retain the text or range as provided for vague numbers (e.g., 'hundred million,''several billion'). If the information is missing, assign 'NULL'."
– "Num_Unit": "The currency of the economic damage, like USD, EUR. If Economic_Damage is missing from the previous step, assign 'NULL'."
– "Num_Inflation_Adjusted": "Indicate 'Yes' if the economic damage amount has been adjusted for inflation; otherwise "No", If Economic_Damage is missing from the previous step, assign 'NULL'."
– "Num_Inflation_Adjusted_Year": "The year of inflation adjustment for the economic damage, if applicable; If Economic_Damage is missing from the previous step, assign 'NULL'."
– "Annotation": "Cite the header name from the article provided where you find the information about the economic damage in this location. The output should only include the header name."

}}]
Ensure to capture all instances of economic damage mentioned in the article, including direct and indirect causes. Only Give Json output, no extra explanation needed. """
],
"main_event_hazard": [
"""
Based on information box {Info_Box} and header−content pair article {Whole_Text}, extract main_event category and hazard information associated with the {Event_Name}, along with supporting annotations from the article.
Below is the Main_Event−−Hazard association table,
Main Event: Flood; Hazard: Flood
Main Event: Extratropical Storm/Cyclone; Hazards: Wind; Flood; Blizzard; Hail

```
        Main Event: Tropical Storm/Cyclone; Hazards: Wind; Flood; Lightning
        Main Event: Extreme Temperature; Hazards: Heatwave; Cold Spell
        Main Event: Drought; Hazard: Drought
        Main Event: Wildfire; Hazard: Wildfire
        Main Event: Tornado; Hazard: Wind
        first identify the Main_Event category information from the text, and organize this
            information in JSON format as follows:
          – "Main_Event": "identify the event category of the {Event_Name} referring the
              Main_Event−−Hazard table, and only one Main_Event category should be
              assigned."
          – "Main_Event_Annotation": "Cite "Info_Box" or the header name from the article
              provided where you find the information about the Main_Event category. The
              output should only include "Info_Box" or the header name."
        based on the result of the Main_Event category from the previous step and the
            Main_Event−−Hazard table, identify the hazard information and organize this
            information in JSON format as follows:
          – "Hazards": "Identify the hazards of the {Event_Name}, make sure the hazards are
              associated with the Main_Event category from the table, and if more than one
              hazard is detected from the text, separate them with '|'. "
          – "Hazards_Annotation": "Cite "Info_Box" or the header name from the article
              provided where you find the information about the hazard information. The
              output should only include "Info_Box" or the header name."
         Only Give Json output, no extra explanation needed."""
    ]

  }
```

**Listing 3.** The full text of V3.2 prompt

```
V3.2 prompt={
 "location_time": [
        """
        Based on information box {Info_Box} and header−content pair article {Whole_Text},
            extract time and location information associated with the {Event_Name}, along
            with supporting annotations from the article.
        the first is to identify the time information of the event {Event_Name}, and organize
            this information in JSON format as follows:
        – "Start_Date": "The start date of the event. If the specific day or month is not known,
            include at least the year if it's available. If no time information is available, enter
            'NULL'. If the exact date is not clear (e.g., "summer of 2021", "June 2020"), please
            retain the text as mentioned."
        – "End_Date": "The end date of the event. If the specific day or month is not known,
            include at least the year if it's available. If no time information is available, enter
            'NULL'. If the exact date is not clear (e.g., "summer of 2021", "June 2020"), please
            retain the text as mentioned."
        – "Time_Annotation": "Cite "Info_Box" or the header name from the article provided
            where you find the information about the time. The output should only include
            "Info_Box" or the header name."
        the second is to identify all countries affected by {Event_Name} and organize this
            information in JSON format as follows:
        – "Administrative_Areas": "List all countries mentioned in the text affected by
            {Event_Name}. The list should be formatted as ["country1", "country2"]."
        – "Administrative_Areas_Annotation": "Cite "Info_Box" or the header name from the
            article provided where you find the information about the affected countries. The
            output should only include "Info_Box" or the header name."
         Only Give Json output, no extra explanation needed."""
    ]

}
```

## 5. EVALUATION OF THE PIPELINE

### A. Annotation data

**Table S6.** Main Event category distribution in the gold standard development set and test set.

| Event Category | Development set | Test set |
|---|---|---|
| Tropical Storm/Cyclone | 46 | 123 |
| Wildfire | 10 | 1 |
| Flood | 7 | 14 |
| Drought | 1 | 1 |
| Tornado | 1 | 0 |
| Extratropical Storm/Cyclone | 3 | 16 |
| Extreme Temperature | 2 | 1 |

### B. Inter-annotator agreement in the gold standard data

**Table S7.** Inter-annotator evaluation results (L1).

| Field | Score |
|---|---|
| Weighted_Score | 0.0 |
| Main_Event | 0.0 |
| Event_Names | 0.0 |
| Hazards | 0.0 |
| Start_Date_Day | 0.0 |
| Start_Date_Month | 0.0 |
| Start_Date_Year | 0.0 |
| End_Date_Day | 0.0 |
| End_Date_Month | 0.0 |
| End_Date_Year | 0.0 |
| Administrative_Areas_Norm | 0.0 |
| Total_Deaths_Min | 0.0 |
| Total_Deaths_Max | 0.0 |
| Total_Injuries_Max | 0.0 |
| Total_Injuries_Min | 0.0 |
| Total_Buildings_Damaged_Min | 0.0 |
| Total_Buildings_Damaged_Max | 0.0 |
| Total_Affected_Min | 0.0 |
| Total_Affected_Max | 0.0 |
| Total_Homeless_Min | 0.0 |
| Total_Homeless_Max | 0.0 |
| Total_Displaced_Min | 0.0 |
| Total_Displaced_Max | 0.0 |
| Total_Damage_Min | 0.0 |
| Total_Damage_Max | 0.0 |
| Total_Damage_Unit | 0.0 |
| Total_Damage_Inflation_Adjusted | 0.0 |
| Total_Damage_Inflation_Adjusted_Year | 0.0 |
| Total_Insured_Damage_Min | 0.0 |
| Total_Insured_Damage_Max | 0.0 |
| Total_Insured_Damage_Unit | 0.0 |
| Total_Insured_Damage_Inflation_Adjusted | 0.0 |
| Total_Insured_Damage_Inflation_Adjusted_Year | 0.0 |

**Table S8.** Inter-annotator evaluation results (L2 and L3). "Average" is the mean value of all scores in each column.

| Category | L2 | L3 |
|---|---|---|
| Deaths | 0.5312 | 0.5630 |
| Injuries | 0.4462 | 0.6605 |
| Homeless | NA | NA |
| Displaced | NA | 0.8750 |
| Affected | 0.5019 | NA |
| Buildings Damaged | 0.4852 | 0.8056 |
| Insured Damage | NA | NA |
| Damage | 0.5606 | 0.5462 |
| Average | 0.5050 | 0.6900 |

**Table S9.** Mean number of entries per impact category (L2 and L3) in the articles that were double-blind annotated.

| | L2 | | L3 | |
|---|---|---|---|---|
| | Annotation 1 | Annotation 2 | Annotation 1 | Annotation 2 |
| Deaths | 1.00 | 1.50 | 1.90 | 2.10 |
| Injuries | 0.30 | 0.80 | 0.50 | 0.60 |
| Homeless | NA | 0.20 | 0.10 | NA |
| Displaced | NA | 0.10 | 0.80 | 0.20 |
| Affected | 0.10 | 0.20 | 0.10 | NA |
| Buildings Damaged | 0.20 | 1.20 | 1.80 | 1.00 |
| Insured Damage | NA | NA | NA | NA |
| Damage | 0.60 | 1.00 | 0.50 | 0.40 |

### C. Matching algorithm selection in L2 and L3

To test the matching algorithm, we design five sets of experiments (Table S10). As default, we set the weights for all fields used when matching to 1, the similarity threshold to 0.6, and the null penalty to 0.5. In settings 1–4, we assign some items which are mandatory like Num_Min, Num_Max, Administrative_Areas_Norm to weight 1, and we select weight 0.125 for nullable items. This enables us to elucidate the contribution of the mandatory fields for the matching algorithm. The evaluation results (Table S11) indicate that this adjustment has a better matching performance than the default setting in L2, but slightly worse in L3 (cf. Default with Setting 1). In the rest of the settings, we adopt the weights from Setting 1, and consider different similarity thresholds and null penalty values. For setting 2, we increase the null penalty to achieve a closer match between entries. Settings 3 and 4 are used to test if the algorithm performs as designed and to check the algorithm's consistency. In setting 3, the null penalty is changed to 0. This means that when the LLM output Num_Min is "NULL" and the gold standard is "12", the score for that item becomes "0" instead of "1" which increases similarity. Consequently, entries with more "NULL" values are more likely to match the gold standard, giving a higher error rate in the L2 and L3 evaluation results. In setting 4, the similarity threshold is set to 0, meaning that even if all fields in the LLM output entry are "NULL" it will still be matched with a gold entry since the similarity score remains above 0 in our matrix. For each setting, we compute the mean scores of each field for different impact categories in the development set. In this step, all impact categories are given equal weight. In setting 2, we note that increasing the null penalty from 0.5 to 1 improves the L3 matching process compared to setting 1. Setting 3 produces the highest error rate, as expected from its algorithmic design. In setting 4, we observe that the average L2 and L3 scores match setting 2. Also, we see that the L3 error rate is generally higher than L2 (Table S11), highlighting the challenge for the model to accurately capture more granular, sub-national impacts compared to national impacts. Across impact categories, performance is notably stronger in injuries, homeless, displaced categories than in others.

**Table S10.** Parameter settings in the matching process used for L2 and L3 evaluation.

| Experiment | Weight | Similarity Threshold | NULL Penalty |
|---|---|---|---|
| Default | 1.0 for all | 0.6 | 0.5 |
| Setting 1 | 1.0 for non-nullable items, 0.125 for nullable items | 0.6 | 0.5 |
| Setting 2 | 1.0 for non-nullable items, 0.125 for nullable items | 0.6 | 1.0 |
| Setting 3 | 1.0 for non-nullable items, 0.125 for nullable items | 0.6 | 0.0 |
| Setting 4 | 1.0 for non-nullable items, 0.125 for nullable items | 0.0 | 1.0 |

**Table S11.** Evaluation results with precision to four decimal places for 55 events in the development set, showing weighted scores for each impact category in L2 and L3 under different matching algorithm settings. For example, in the homeless category at L2 under the default setting, a value of 0.3792 indicates that when considering all items with the same weight, the weighted score for the homeless category is 0.3792. This represents a 0.3792 error rate of the LLM compared to the gold standard.

| | **Default** | | **Setting 1** | | **Setting 2** | | **Setting 3** | | **Setting 4** | |
|---|---|---|---|---|---|---|---|---|---|---|
| | L2 | L3 | L2 | L3 | L2 | L3 | L2 | L3 | L2 | L3 |
| Deaths | 0.5270 | 0.6283 | 0.5283 | 0.6464 | 0.5283 | 0.6438 | 0.5283 | 0.6498 | 0.5283 | 0.6438 |
| Injuries | 0.3125 | 0.4709 | 0.3141 | 0.4737 | 0.3141 | 0.4718 | 0.3141 | 0.4844 | 0.3141 | 0.4718 |
| Homeless | 0.3792 | 0.4832 | 0.3743 | 0.4849 | 0.3743 | 0.4849 | 0.3743 | 0.4965 | 0.3743 | 0.4849 |
| Displaced | 0.3667 | 0.4490 | 0.3632 | 0.4496 | 0.3632 | 0.4494 | 0.3913 | 0.4924 | 0.3632 | 0.4494 |
| Affected | 0.4652 | 0.5325 | 0.4641 | 0.5324 | 0.4641 | 0.5297 | 0.4678 | 0.5500 | 0.4641 | 0.5297 |
| Buildings_Damaged | 0.5433 | 0.5983 | 0.5410 | 0.6068 | 0.5410 | 0.5956 | 0.5570 | 0.6479 | 0.5410 | 0.5956 |
| Insured_Damage | NA | 0.5052 | NA | 0.5052 | NA | 0.5052 | NA | 0.5052 | NA | 0.5052 |
| Damage | 0.4553 | 0.4960 | 0.4537 | 0.4964 | 0.4537 | 0.4964 | 0.4537 | 0.4964 | 0.4537 | 0.4964 |
| Average | 0.4356 | 0.5204 | 0.4341 | 0.5244 | 0.4341 | 0.5221 | 0.4409 | 0.5403 | 0.4341 | 0.5221 |

## 6. EM-DAT DISASTER TYPE MAPPING

**Table S12.** Mapping of EM-DAT disaster subtype to Wikimpacts 1.0 main event categories

| EM-DAT disaster subtype | Wikimpacts 1.0 main event category |
|---|---|
| Riverine Flood | Flood |
| Tropical Cyclone | Tropical Storm/Cyclone |
| Flood (General) | Flood |
| Storm (General) | Storm |
| Flash Flood | Flood |
| Drought | Drought |
| Forest Fire | Wildfire |
| Wildfire (General) | Wildfire |
| Cold Wave | Extreme Temperature |
| Tornado | Tornado |
| Severe Weather | Storm |
| Heat Wave | Extreme Temperature |
| Blizzard/Winter Storm | Storm |
| Lightning/Thunderstorms | Storm |
| Extra-Tropical Storm | Extratropical Storm/Cyclone |
| Hail | Storm |
| Land Fire (Brush, Bush, Pasture) | Wildfire |
| Coastal Flood | Flood |
| Severe Winter Conditions | Extreme Temperature |
| Storm Surge | Flood |
| Glacial Lake Outburst Flood | Flood |

## 7. NORMALIZATION RULES

In some cases, the quantitative information in the Wikipedia articles may be expressed as comparative adjectives or quantifiers. The following rules only suit the cases where a single number is presented. If the text already mentions two numbers, we automatically assign a range without applying the rules below. In these cases, we first, define the scale of a number:

**Proposition 0:** The scale of a number $N$ is the power of ten corresponding to the last non-zero digit, where:

$$N = a \times 10^n,$$

where

- $a$: $a$ is an integer with all the non-zero digits to the left of the decimal point
- $n$: $n$ is an integer
- scale: scale = $10^n$

Note: This is a modification of the scientific notation of a number, in which case $a$ is an integer with a non-zero digit to the left of the decimal point. According to our definition, the scale of

- $500 = 5 \times 10^2$ corresponds to $10^2 = 100$

- $560 = 56 \times 10^1$ corresponds to $10^1 = 10$
- $543 = 543 \times 10^0$ corresponds to $10^0 = 1$

This scale is then used to convert expressions such as "at least 560", "over 560", "less than 560" into ranges, according to the following proposition.

**Proposition 1:** As a general rule, the length of an interval estimated to the left or to the right of a given number must be equal to the scale of the number. In other words, all departures or shifted departures to each side of the number must be at a distance equal to the scale of the number. Therefore, the length of a range (the absolute difference between the range's boundaries) is equal to:

- The scale of the number, in the case of "more than", "less than" and "at least" and all the synonyms of these expressions. For a given number $N$, and its scale:
  1. At least $N \rightarrow N \in [N, N + \text{scale}]$, # over, inclusive
  2. Over $N \rightarrow N \in [N + 1, N + 1 + \text{scale}]$ # over, exclusive
  3. Less than $N \rightarrow N \in [N - 1 - \text{scale}, N - 1]$. # under, exclusive
  4. At most $N \rightarrow N \in [N - \text{scale}, N]$ # under, inclusive
- Twice the scale, in the case of "about" and all the synonyms of this word
  - About $N \rightarrow N \in [N - \text{scale}, N + \text{scale}]$
- In the case of "about $N$" and "less than $N$", the lower boundary of the estimated interval does not include zero, but stops at 1. If an impact is reported, it is not zero, even if the exact value is uncertain.

**Examples, range estimations:**

| | 500 | 560 | 543 | 3.54e3 |
|---|---|---|---|---|
| At least | [500,600] | [560,570] | [543,544] | [3540,3550] |
| Over | [501,601] | [561,571] | [544,545] | [3541,3551] |
| Less than | [399,499] | [549,559] | [541,542] | [3529,3539] |
| At most | [400,500] | [550,560] | [542,543] | [3530,3540] |
| About | [400,600] | [550,570] | [542,544] | [3530,3550] |

Rules for equivalent expressions and additional expressions are indicated below, through some examples:

1. Greater than/more than/exceed/over/+ 700: 701-801 (700 + 1, 700+1+scale), scale = 100
2. Less/lower/fewer than 700: 599-699 (700-1-scale, 700 – 1), scale = 100
3. At least/a minimum of 630: 630-640 (630, 630 + scale), scale = 10
4. Up to 270: 260-270 (270-scale,270)
5. Approximately/around/nearly/about/almost/roughly/ / estimated 700: 600-800 (700-scale, 700+scale), scale = 100
6. Dozens of, tens of, hundreds of, thousands of, etc: 2*scale - 9*scale; so, "thousands of injuries" becomes 2000-9000 injuries.
   - Tens: scale = 10
   - Dozens: scale = 12
   - Hundreds: scale = 100
   - Thousands: scale = 1000
7. A number of/a group of/a few/several/numerous: 2-6

8. A few dozen: 24-72 (12*2, 12*6)
9. A dozen hundreds (if it ever appears!): 2400-7200 (12*2*scale, 12*6*scale)
10. A few/several hundred/thousand/million, etc: 2*scale-6*scale; so “several millions” becomes 2000000-6000000.
11. Many: 20-60
12. SPECIAL CASE: A couple/a couple hundred/thousand, etc...: 2*scale – 3*scale; so “a couple of deaths” becomes 2-3 deaths
13. SPECIAL CASE: If the number of human victims is reported as “family/families”, multiply by 5 to determine the number of human victims. For “families”, use 2*5-9*5 if there is no number before families. For example: “5 families are displaced” = 5*5 = 25 people displaced, “dozens of families were evacuated” =2*12*5-9*12*5 = [120,540] people displaced.
14. SPECIAL CASE: "minimal", “inconsequential”, "negligible", "minor", and "limited", put “NULL” in the validation table.
15. SPECIAL CASE: no causalities, no fatalities, no injuries, none, none reported, and similar expressions must be annotated as 0. If the information is missing, the annotator must enter NULL instead.

## 8. CONSOLIDATION RULES

### A. Administrative Areas

If the joint set of L2/L3 is larger than the one obtained in L1, the extra areas need to be filled in L1 automatically.

### B. Impact Categories

If L1 is `NULL`, but impact information is found in L2 or L3, there are several cases to consider:

1. L2 is not `NULL`, L3 is `NULL`:
   - Sum up the numbers from L2 and fill in L1.
2. L2 is `NULL`, and L3 is not `NULL`:
   (a) For the same `admin_area`, and impact category in different locations, sum up the numbers and fill a new entry in L2.
   (b) Next, sum up the numbers from L2 to fill in L1.
3. L2 and L3 are not `NULL`:
   (a) For the same `admin_area`, and impact category in different locations, sum up the numbers in L3 and compare with the number in L2. If the L3 number is smaller, revise the L2 `Num_Min` to this L3 number. If the L3 number is larger, then revise the `Num_Max` in L2 (ideally, this would not happen, because we ask the model to retrieve the total in L2).
   (b) If the `admin_area` in L3 is not in L2, sum up the numbers and create a new entry in L2.
   (c) Next, sum up all numbers from L2, and fill in L1 with the range.

### C. Time

Often, the time information in L2 and L3 is missing. For any case without a year, fill the year in L2 and L3 using the same year as in L1.

### D. Currency conversion and inflation adjustment

#### *D.1. Currency Conversion: Non-USD to USD*

To convert a non-USD currency to USD, we utilize the table `Currency_conversion_yearly_averages.xlsx`. Each sheet within this table contains the yearly mean conversion rate of Non-USD to USD. For instance, consider the EUR-USD conversion:

In the table, the conversion rate for 2024 is 0.92. Therefore, 10 euros in 2024 is equivalent to:

$$Y = \frac{X}{\text{rate}}$$

where $Y$ is the amount in USD, $X$ is the original currency amount, and rate is the yearly mean conversion rate. In our example, 10 euros in 2024 is:

$$Y = \frac{10}{0.92} = 10.87 \text{ USD}$$

#### *D.2. Inflation Adjustment*

To adjust for inflation, use the table `Database/data/inflation_Index_2024.csv`. For example, to convert $100 in 2023 USD to 2024 USD:

$$Y = X \times \left( \frac{100}{X_{\text{index}}} \right)$$

where $Y$ is the price in 2024, $X$ is the price in the original year, and $X_{\text{index}}$ is the inflation index for the original year. For $100 in 2023 USD:

$$Y = 100 \times \left( \frac{100}{96.9} \right) = 103.2 \text{ USD}$$

#### *D.3. USD to EUR Conversion*

After the database consolidation process in damage and insured damage fields, storing it in a database file, we convert 2024 USD to 2024 EUR using the 2024 yearly mean rate, which is 0.919601:

$$Y = X \times 0.919601$$

where $Y$ is the amount in 2024 EUR and $X$ is the amount in 2024 USD.

## 9. L3 VISUALIZATION

**Listing 4.** Excluded Geojson shapes in L3 visualization process

```
excluded_values = [
    "arabian-sea---bhr-l-rb--central-",
    "arabian-sea---bhr-l-rb",
    "arabian-sea",
    "bay-of-bengal--northern-",
    "bay-of-bengal--central-",
    "bay-of-bengal--west-",
    "bay-of-bengal",
    "nonafot-nunavut",
    "greenland",
]
```