Event Registry

learning about the world through the news media

Gregor Leban, CEO
Event registry (http://eventregistry.org/)

• Encyclopedia for world events

• Event registry is a system for
  • collecting news content published globally
  • automatic identification of world events from news articles

• Extraction of core event information

• Extensive search and visualization options
Why is it useful?

• Huge amount of news content generated daily in unstructured form
• Using AI we can transform it to structured form
• Structured form allows use of various facets (time, locations, topics, ...) to isolate specific content of interest
• Used by: Risk analysts, policy makers, stock traders, NGOs, financial institutions, ...
What is an event?

- Event = any significant happening in the world
- Assumption: If something is significant $\rightarrow$ reported by various news publishers
- Event is identified through a collection of news articles that report about the same thing
Explosion on Tube at Parsons Green leaves commuters with 'facial burns'

A blast that ripped through a London Underground train this morning injuring 20 is believed to be a terror attack, according to reports. There are warnings a suspect armed with a knife is still on the run as bomb squads are called in to deactivate a second device. This morning’s explosion left commuters with “facial burns” after a “fireball flew down a carriage”. People fled the station screaming as the blast sent flames flying with a Metro reporter at the scene saying people are “really badly”.

Refugees From Burundi Killed in Congo, Activists Say

NAIROBI, Kenya -- At least 34 refugees who had fled political violence in Burundi were killed by government forces in the neighboring Democratic Republic of Congo, a civil society group said Saturday. A Congolese government spokesman could not immediately be reached for comment, and the number of deaths and other details about the episode could not be independently verified. The events occurred Friday afternoon in Kamanyola in eastern Congo when a group of Burundian refugees went to an office.

World hunger again on the rise, driven by conflict and climate change, new UN report says

15 September 2017 | Rome - After steadily declining for over a decade, global hunger is on the rise again, affecting 815 million people in 2016, or 11 per cent of the global population, says a new edition of the annual United Nations report on world food security and nutrition released today. At the same time, multiple forms of malnutrition are threatening the health of millions worldwide. The increase - 38 million more people than the previous year - is largely due to the proliferation of...
Event registry pipeline

Data collection → Article-level processing → Event construction → Event storage & maintenance

- Semantic annotation
- Extraction of date references
- Detection of article location
- Cross-lingual article matching
- Detection of article duplicates
- Article clustering
- Cross-lingual cluster matching
- Event formation
- Event info. extraction
- Filling event template
- Identifying related events

Main stream news

Manual event administration

Frontend interface

API access
We want to capture the meaning of the words mentioned in the text.

| It’s a version of **Chicago** – the standard classic Macintosh menu font, with that distinctive thick diagonal in the ”N”. | **Chicago** was used by default for Mac menus through MacOS 7.6, and OS 8 was released mid-1997. | **Chicago VIII** was one of the early 70s-era **Chicago** albums to catch my ear, along with **Chicago II**. |
Article semantic annotation (2)

- **Ambiguity** – same word, different meaning (e.g. Chicago)
- **Variability** – different words, same meaning (Mac, Macintosh)
- **Entity linking** = Named entity recognition + disambiguation

| It’s a version of *Chicago* – the standard classic *Macintosh* menu font, with that distinctive thick diagonal in the "N". | *Chicago* was used by default for *Mac* menus through *MacOS 7.6*, and *OS 8* was released mid-1997. | *Chicago VIII* was one of the early 70s-era *Chicago* albums to catch my ear, along with *Chicago II*. |

https://en.wikipedia.org/wiki/Chicago_(typeface)  
https://en.wikipedia.org/wiki/Macintosh  
Syria conflict: Government offers prisoner exchange Syria’s foreign minister has said Damascus is ready to offer a prisoner exchange with rebels. Speaking in Moscow, Walid al-Moallem also said he had presented a ceasefire plan for the second city Aleppo to his Russian counterpart, Sergey Lavrov. The move came as the opposition Syrian National Coalition prepares to meet in Istanbul to decide whether to go to next week’s peace conference. The coalition is under Western pressure to participate in the Geneva II talks. However, many of its members have already pulled out. Some are reluctant to go unless President Bashar al-Assad is excluded from any transitional government; but Damascus says there should be no pre-conditions for the talks. The three-year conflict has claimed more than 100,000 lives. An estimated two million people have fled the country and some 6.5 million have been internally displaced. Aleppo example” Mr Moallem said he was ready to exchange lists of prisoners. “I informed Lavrov of our principled position in favour of an agreement to exchange those held in Syrian prisons for those taken by the other side,” he said. “We are ready to exchange lists and develop the necessary mechanism for accomplishing these goals.” The Syrian foreign minister added that he had given Russia a ceasefire plan for Aleppo, which he said he wanted to “serve as an example to other towns”. But correspondents say it remains far from clear that even a partial ceasefire could be achieved. On Thursday, the two foreign ministers held talks with Iranian officials. Mr Lavrov said there was “no hidden agenda” to their meeting. “This does not mean that we have some tri-party (peace) draft,” he told reporters. Mr Lavrov is keen on Iran to be part of the peace talks, but US Secretary of State John Kerry has said that Tehran must first agree to the Geneva I commune which calls for a political transition in Syria. Huge doubts: The Syrian National Coalition is deeply divided, with its key bloc, the Syrian National Council - threatening to boycott the talks. Of the 120 members of the coalition, 44 have already pulled out of the meeting in Switzerland. But all of them - and their regional backers such as Qatar and Saudi Arabia - are under huge pressure from the Americans and others to take up the opportunity to achieve the goals of the Syrian revolution, the BBC’s Jim Muir in Lebanon reports. However, our correspondent says that the coalition - if it goes to the talks - will be really weak, with huge doubts about how representative it is, as virtually none of...
Computing similarity between articles in different languages

- Question: how similar is this **Spanish** article to this **English** article?
- Translation tool slow/expensive
- Alternative: Canonical correlation analysis

Documents as vectors
500 dimensions

Common semantic space

**data, mining, knowledge, artificial, machine, discovery, buzzword, term, ...,**

**datos, minería, modelos, utilizando, procesamiento inteligencia, ...,**
Article clustering

• For each language we try to identify groups of articles that describe a single event

• Online clustering algorithm

• Cluster based on
  • article title
  • article content
  • detected named entities

Different articles about same event
Joining clusters in different languages

• Each cluster only contains articles in the same language
• Clusters in different languages can describe the same event – how do we find them?
• Use machine learning to decide

English cluster

SpaceX lands its third consecutive rocket on ship in Atlantic Ocean
Yes, SpaceX has done it again. For the fourth time, it has managed to have a successful rocket landing. On Friday at 5:40pm, Falcon 9 rocket blasted off from Cape Canaveral, Florida, carrying the Thaicom 8 satellite.
The rocket returned to earth around 10 minutes later. It made a landing in an...

SpaceX launches Asian satellite, attempts to land rocket
© SPACEX/AFP/FileThe Falcon 9 rocket on December 16, 2015 in Cape Canaveral -- SpaceX has managed to successfully land the first stage of its Falcon 9 rockets three times before.
Miami (AFP) - SpaceX on Friday launched an Asian communications satellite before trying for a fourth successful landing...

SpaceX makes fourth successful rocket landing
That would make space deliveries - and travel - more economical
Elon Musk's SpaceX company notched up another victory today when it managed to...

Spanish cluster

SpaceX lo ha vuelto a hacer
La empresa californiana de transporte aeroespacial logró poner en órbita otro satélite de comunicaciones y hacer un aterrizaje en medio del mar la primera fase de su cohete Falcon 9.
Ya es la tercera vez que la compañía liderada por Elon Musk vuelve a anotar otro gran logro tambi...
Event formation

- Using one or more linked clusters we form an event
- From the articles in the event we extract event information:
  - Location
  - Event date
  - Main event entities and keywords
  - Event categories
  - Event title and snippet
DEMO (http://eventregistry.org/)
List of articles

The list contains the information about articles that match the search criteria.

425,614 articles match the search criteria

U.S. oil prices hit $50 on rising refinery demand, falling rig count
By Henning Gloystein
SINGAPORE (Reuters) - U.S. crude oil prices rose above $50 per barrel on Monday and were near last week's multi-month highs as the number of U.S. rigs drilling for new production fell and refineries continued to restart after getting knocked out by Hurricane Harvey.
U.S. West ...

El Caribe en alerta ante llegada de huracán
Las islas del Caribe, devastadas por Irma hace 10 días, se preparaban para la llegada hoy de un nuevo huracán, María, que podría ganar más fuerza y causar daños considerables.
María se convirtió en huracán ayer mientras se dirigía hacia el este del Caribe con vientos de 120 km/h. Informó ...

Así se ve desde el espacio los efectos del huracán Irma sobre algunas islas del Caribe
El huracán Irma atravesó el Océano Atlántico en septiembre de 2017, golpeando a varias islas del Caribe antes de trasladarse a los Cayos de Florida y al suelo continental de los Estados Unidos. A medida que las nubes se fueron alejando de algunos lugares, como las Islas Virgenes, la ...

Climat: les USA cherchent à travailler avec des "partenaires" de l'accord de Paris (Tillerson)
Après plusieurs déclarations contradictoires sur la politique environnementale des Etats-Unis, le secrétaire d'Etat Rex Tillerson a déclaré dimanche que Washington recherchait "les moyens de travailler avec des partenaires de l'accord climat de Paris".
"Nous voulons être productifs, nous ...
Caribbean under hurricane watch again. Tropical Storm Maria following Irma’s track.

WHEN: Sun, September 17, 2017
WHERE: Miami, United States of America
CATEGORIES: Science—Earth Sciences
ABOUT: Tropical cyclone, Storm, National Hurricane Center, Guadeloupe, United States of America, Antilles, Caribbean, Puerto Rico
ARTICLES: 549 (177 English, 20 German, 152 Spanish, 30 Portuguese, 156 French, 14 Russian)

Tropical Storm Maria formed in the Atlantic Saturday afternoon, threatening to pound islands already hit hard by Irma with another hurricane early next week. In an 8 p.m. update, National Hurricane Center forecasters said Maria will likely bring dangerous winds, more storm surge and heavy rain to parts of the Lesser Antilles and strengthen into a hurricane Sunday, then approach the Leeward Islands on Monday. On Saturday evening, hurricane watches were issued for Antigua, Barbuda, St. Kitts. (Bradenton Herald)

Tropical Storm Jose may threaten Northeast next week

WHEN: Fri, September 15, 2017
CATEGORIES: Science—Earth Sciences
ABOUT: Tropical cyclone, Atlantic Ocean, National Hurricane Center, United States of America, Maximum sustained wind, East Coast of the United States, Tropics, Storm, Tropical cyclone warnings and watches, Hurricane Jose (1999), Saffir-Simpson hurricane wind scale, Puerto Rico
ARTICLES: 508 (508 English)

Chat with us on Facebook Messenger. Find out what’s happening in the world as it unfolds. Story highlights: Jose is expected to strengthen into a hurricane again later Friday. The storm could bring rain and winds to the Northeast next week (CNN) Tropical Storm Jose is expected to strengthen into a hurricane again later Friday and turn north, threatening to bring rain and wind to the US Northeast next week. Jose remains out in the Atlantic Ocean and is moving toward the northwest, and that motion (CNN International)

Hurricane Irma strengthens, tears through Cuba on its way to Florida

WHEN: Wed, September 6, 2017
WHERE: Miami, United States of America
CATEGORIES: Society—Issues, Science—Earth Sciences
ABOUT: Tropical cyclone, Florida, United States of America, United States of America, Caribbean, Island, Puerto Rico, National Hurricane Center
ARTICLES: 9426 (5175 English, 383 German, 1711 Spanish, 8 Catalan, 436 Portuguese, 165 Italian, 1325 French, 129 Russian, 11 Slovene, 50 Croatian, 33 Serbian)

Story highlights: "If you have been ordered to evacuate, leave now," Florida governor says. Irma is expected to be near the Florida Keys and South Florida by early Sunday (CNN) Hurricane Irma tore through northern Cuba during its long, destructive march toward Florida, where it's expected to bring catastrophic damage to parts of the state. The powerful Category 5 storm had sustained winds of 160 mph when it made landfall on Cuba's Camaguey Archipelago, the National Hurricane Center said late (CNN International)
### Top concepts in events

List of concepts (entities and non-entities) that best describe what the events are about.

#### ENTITIES

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<tr>
<th>Concept</th>
<th>Concept relevance</th>
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#### NON-ENTITIES

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<tr>
<td>Saffir–Simpson hurricane wind scale</td>
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</tbody>
</table>
Timeline of events

See when the events that match the search criteria were published. Click a particular column to display a list of events for that date.
9578 events have a known geographic location

The map shows the relevant locations for the events. The number of shown events can be lower than the number of search results since we might not be able to determine event location for all events. Choose a particular time period in the bottom to highlight only a subset of events.
Categories of events

Chart represents the distribution of events into different categories. Click a particular segment to display events in the category.

14.4% events belong to this category.
Categories of events
Chart represents the distribution of events into different categories.
Click a particular segment to display events in the category.

0.941% events belong to this category
Crude falls, gasoline surges as Harvey hits southern Texas

WHEN: Sun, August 27, 2017
WHERE: Houston, United States of America
ABOUT: United States of America, Petroleum, Gasoline, Refinery, Texas, United States of America, Oil refinery, Barrel (Unit), Gulf Coast of the United States, Flood, Louisiana, United States of America, Futures contract, Houston, United States of America
ARTICLES: 554 (531 English, 23 Spanish)
Clouds from Hurricane Harvey are seen in the background as smoke rises from a burn off at an oil refinery in Corpus Christi, Texas, U.S. August 26, 2017. (Xinhua/REUTERS) by Xinhua Writer Sun Ou meng NEW YORK, Aug, 30 (Xinhua) -- U.S. crude prices continued to decline and gasoline futures surged on Wednesday, as Hurricane Harvey shuts down more than 20 percent of U.S. refinery capacity, ripping through the heart of the oil industry. Now tropical storm Harvey has ravaged Houston, home to (Xinhuanet.com)

UPDATE 1 - Buckeye targets normal operations at Bahamas oil terminal on Tuesday

WHEN: Tue, September 12, 2017
WHERE: New York City, United States of America
ARTICLES: 7 (7 English)
NEW YORK, Sept 12 (Reuters) - Buckeye Partners LP said it aims to resume normal operations its Bahamas crude oil and fuel terminal, also known as Borco, on Tuesday after Hurricane Irma rampaged through the Caribbean as one of the most powerful Atlantic hurricanes on record. The terminal, located in Freeport, on Grand Bahama Island, has no reported injuries, incidents or damage and restart activities began on Monday afternoon, the company said. While power is still out at the terminal, Buckeye (Reuters)

Hurricane Harvey makes landfall in Texas - latest updates

WHEN: Sat, August 26, 2017
WHERE: Corpus Christi, United States of America
ARTICLES: 472
Hurricane Harvey makes landfall in Texas, bringing heavy rain, flooding to southern Texas. The National Weather Service said Harvey was expected to bring up to 30 inches of rain to the area, with isolated totals of up to 40 inches. The storm also brought strong winds and heavy waves to the region, with gusts reaching up to 75 miles per hour. The hurricane made landfall as a Category 4 storm, with winds of 130 miles per hour. The storm has already caused widespread damage, with homes and businesses destroyed and flooding affecting many areas. (Reuters)
Caribbean under hurricane watch again. Tropical Storm Maria following Irma’s track.

Sun, September 17, 2017
Science→Earth Sciences

Tropical Storm Maria formed in the Atlantic Saturday afternoon, threatening to pound islands already hit hard by Irma with another hurricane early next week. In an 8 p.m. update, National Hurricane Center forecasters said Maria will likely bring dangerous winds, more storm surge and heavy rain to parts of the Lesser Antilles and strengthen into a hurricane Sunday, then approach the Leeward Islands on Monday. On Saturday evening, hurricane watches were issued for Antigua, Barbuda, St. Kitts.

Title and summary extracted from: Bradenton Herald

Tropical Storm Maria upgraded to Category 1 hurricane
(CNN) -- Hurricane Maria was upgraded from a tropical storm Sunday afternoon as it takes aim at Caribbean islands devastated less than two weeks ago by Hurricane Irma.

As of Sunday afternoon, Maria was about 140 miles (225 kilometers) east northeast of Barbados, according to the National Hurricane Center...
Event concepts
Top concepts describing what the event is about.

ENTITIES

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<tr>
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NON-ENTITIES

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<td>Severe weather terminology</td>
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<td>Hurricane Maria (2005)</td>
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</table>
La tempête Maria est désormais un ouragan et elle met le cap vers les Antilles

Déjà fortement éprouvées par le passage d'Irma début septembre, les Antilles se préparent maintenant à affronter la tempête tropicale Maria, qui s'est transformée dimanche en ouragan et va continuer à se renforcer. Maria est désormais un ouragan se dirigeant vers les Caraïbes, qui viennent d'être e...
Extensive search options
RECAP: Doctors investigating first ebola case in Scotland after aid worker returns from West Africa

WHEN: December 30, 2014
WHERE: London, United Kingdom
KEYWORDS: Ebola virus disease, Hospital, United Kingdom, Infection, Patient, Virus, Disease, London Heathrow Airport, Therapy, Health
ARTICLES: 721 (575 eng, 87 ger, 45 spa, 14 chi, 0 slo)
The authorities will next be contacting passengers on the two flights connecting Casablanca to Heathrow, and the London airport to Glasgow with all relevant precautionary information. Live updates as the first ebola case has been confirmed in an aid worker seeking medical assistance in a Glasgow hospital. 7:44 pm THIS year's Ebola outbreak is the deadliest occurrence of the disease since it was first discovered in 1976. The current outbreak has killed more than all other Ebola outbreaks...

US Withdrawing Most Troops Fighting Ebola in West Africa

WHEN: February 11, 2015
WHERE: Republic of Sierra Leone
KEYWORDS: Ebola virus disease, Epidemic, Disease, President of the United States, The Pentagon, White House, Virus, Infection, Health
ARTICLES: 358 (296 eng, 18 ger, 44 spa, 0 chi, 0 slo)
WASHINGTON -- The United States is preparing to withdraw nearly all of its troops fighting the Ebola outbreak in West Africa, the White House said Tuesday, as the global health crisis recedes amid a sharp decline in Ebola cases. Of the 2,800 troops the U.S. deployed, just 100 will remain in West Africa after April 30, officials said. About 1,500 of those troops have already returned home. Those staying in West Africa will work with Liberia's military, regional partners and U.S. civilians to...
Top concepts in events

List of concepts (entities and keywords) that best describe what the events are about

ENTITIES

|-------------------|--------------------|-------------|---------------|--------------------------|------------------|-------|---------------------------|--------------------------|----------------|-------------|-----------------|-------|-------|-------|--------------------------|-------|-------|----------------|----------------|----------------|-------------------|----------------|----------------|----------------|----------------|

KEYWORDS

| Concept relevance | Ebola virus disease | Virus | Disease | Health | Infection | Hospital | Patient | Physician | Epidemic | Nursing | Outbreak | Symptom | Medicine | Death | Country | Infectious disease | Government | Therapy | Centers for Disease Control and Prevention | Fever | Quarantine | Health care provider | Vaccine | U.S. state | Public health | United Kingdom | Human | Ebola virus | President of the United States |
|-------------------|---------------------|-------|---------|--------|-----------|---------|---------|-----------|----------|---------|----------|---------|----------|-------|---------|---------------------|-----------|--------|-------------------|---------|----------|---------------------|----------|---------|---------------------|------------|---------|---------------------|----------------|---------|---------------------|---------------------|
Tag cloud
Tag cloud displays top keywords extracted from the events
Timeline of events

See when the events that match the search criteria happened. Click a particular column to display a list of top events for that date.
Locations of events about Ebola
Top publishers

The information displays who are the publishers that report the most about the resulting events. The numerical values represent the percent of the resulting events that are covered by a particular publisher. The geographical map shows the locations of the publishers and the circle sizes correspond to percentages.

- **allafrica.com**: 8.6
- **Daily Mail**: 7.4
- **Reuters**: 7.3
- **El Economista (EcoDiario)**: 6.8
- **El Economista**: 6.8
- **Irish Sun**: 6.7
- **Huffington Post**: 6.3
- **Yahoo! News**: 6.1
- **BBC**: 6.1
- **Washington Post**: 6.1
- **es.noticias.yahoo.com**: 6.1
- **ABC News**: 5.8
- **reliefweb.int**: 5.1
- **New York Times**: 5.0
- **The Guardian**: 4.9
- **Boston Business Journal**: 4.6
- **Sify**: 4.6
- **Europa Press (EP)**: 4.3
- **CBC News**: 4.3
Categories related to events about Ebola
Trending of concepts in search results

The visualization shows the trending of individual concepts in the events. You can choose the types of concepts to visualize or enter your own.

Concept types to display & normalization

- Person
- Location
- Organization
- Nonentities

Normalize data by number of imported articles for that day

- Ebola virus disease
- Republic of Liberia
- West Africa
- Disease
- Republic of Sierra Leone
- Health
- Republic of Guinea
- Texas

Texas
Republic of Guinea
Health
Republic of Sierra Leone
Disease
West Africa
Republic of Liberia
Ebola virus disease
Example of a large event

North Korea fires 'unidentified ballistic missile' over Japan

Thu, September 14, 2017
Pyongyang, North Korea

SEUL, South Korea -- President Donald Trump vowed that the U.S. is "100 percent with Japan" after North Korea fired a missile into its airspace, according to the leader of the Asian ally.

Prime Minister Shinzo Abe told reporters he spent 40 minutes on the phone with Trump to discuss Monday's launch -- which he also described as "an unprecedented, serious and significant threat."

In a statement released by the White House on Tuesday, Trump reiterated that "all options are on the table" when it

Title and summary extracted from: NBC News
What the event is about
Timeline of articles

Publishing times of articles describing the event. The height of the curve indicates the number of articles published in last 8 hours.

- Portuguese articles (#188)
- French articles (#257)
- English articles (#1354)
- Spanish articles (#430)
- Arabic articles (#93)
- Indonesian articles (#72)
Sources of the news articles

Map shows the geographic locations of the news sources that published articles about the current event.

Below the map is the time distribution of articles. Click and drag to select a specific time period and highlight only the corresponding subset of sources on the map.
September 6, 2017

'It's possible that N. Korea becomes as hostile to China as to U.S.'

BEIJING -- When Kim Jong Un inherited power in North Korea in late 2011, then-Chinese president Hu Jintao was outwardly supportive of the untested young leader, predicting that "traditional friendly cooperation" between the countries would strengthen. Two years later, Kim ordered the execution of h...
Locations of hurricanes
Future / Ongoing work
Detection of news bias

• Various ways in which news publishers can be “biased”

• Examples:
  • Gender bias
  • News source citations
  • Topic bias
  • Geographical bias
  • Vocabulary bias
Information diffusion/propagation

• Analysis of how information propagates from one publisher to the next
Infobox extraction / slot filling

- Events are of different types (e.g. earthquakes, mergers and acquisitions, product releases, ...)
- For each event type we can define a specific set of properties (slots) that should be extracted.
Causality

• Goal: Finding causal templates in event sequences
• Example 1: campaign events $\rightarrow$ election day $\rightarrow$ inauguration
• Example 2: flood $\rightarrow$ outbreak of a disease
• How to do it:
  • For each event we can identify related events
  • Generalize events to find common patterns