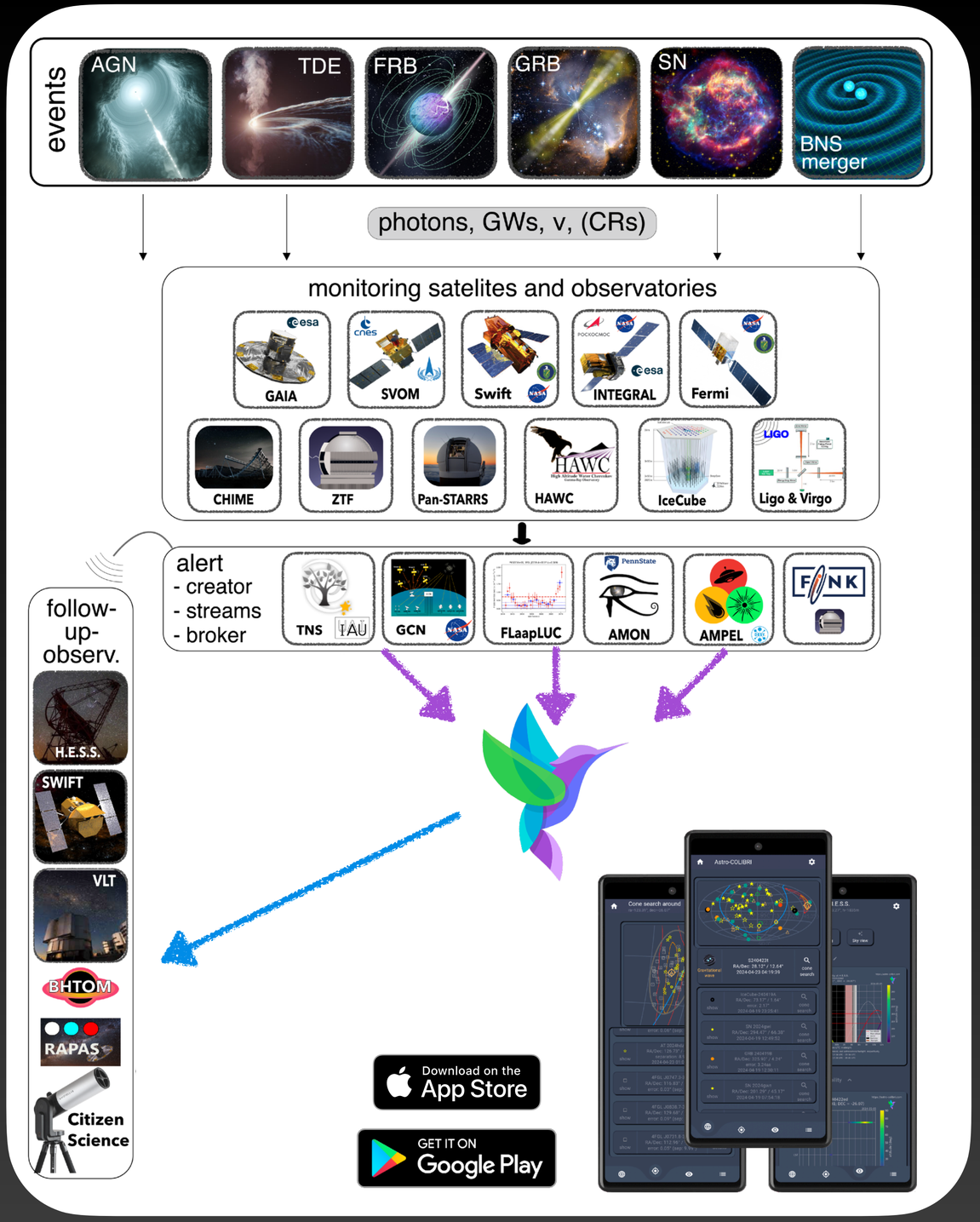


Improve time domain astrophysics

Summary of all publicly available alert channels

Complement existing platforms

Modern platforms:
API + web + smartphones

professional + amateur astronomers

LLMs @ Astro-COLIBRI

- Prototype NLP pipeline for information extraction from observation reports

- Short summary text of each event (target audience: general public)
- Automatic translation of posts in our discussion forum
- Podcast discussing recent papers (NotebookLM => Astro-COLIBRI @ Spotify, etc.)
- Coding support (e.g. unit + integration tests)

Circulars of the General Coordinates Network (GCN)
Astronotes of the Transient Name Server (TNS)
Astronomer's Telegrams

Recurrent Nova M31N 2008-12a: Discovery of the 2024 eruption

ATel #16942; *Jingyuan Zhao (Xingming Observatory), A. W. Shafter, J. C. Horst, R. M. Quimby (SDSU), M. J. Darnley, M. W. Healy-Kalesh (LJMU), K. L. Page (U. Leicester), on behalf of the 12a Collaboration*
*on **13 Dec 2024; 04:31 UT***
Distributed as an Instant Email Notice Novae
Credential Certification: Allen W. Shafter (ashafter@sdsu.edu)

Subjects: Optical, Nova, Transient

Referred to by ATel #: 16944, 16945, 16946

𝕏 Post

We report the discovery of the predicted 2024 eruption of the recurrent nova M31N 2008-12a (see also http://www.cbat.eps.harvard.edu/unconf/followups/J00452894+4154098.html).

The nova is clearly detected in a single 900 s exposure obtained on 2024 Dec. 13.0074 UTC at magnitude CV = 18.6 +/- 0.2 by J. Zhao. The observations were obtained remotely from the 0.61-m f/6.5 Corrected Dall-Kirkham robotic telescope (Lane, 2018, RTSRE, 1, 119) at the Burke-Gaffney Observatory (BGO) of Saint Mary's University (Halifax, Nova Scotia, Canada). Follow-up photometric and spectroscopic observations of this most recent eruption of M31N 2008-12a are strongly encouraged.

GCN Circular 42797

Subject LIGO/Virgo/KAGRA S251105aj: SVOM/ECLAIRs detection of a high-energy transient SVOM J2320.0-2901 through targeted search
Event LIGO/Virgo/KAGRA S251105aj
Date 2025-11-22T10:00:14Z (5 days ago)
Edited On 2025-11-22T21:08:52Z (4 days ago)
From SVOM_group <svomgroup@bao.ac.cn>
Edited By Vidushi Sharma at NASA GSFC/UMBC <vidushi.sharma@nasa.gov> on behalf of SVOM_group <svomgroup@bao.ac.cn>
Via Web form

H. Yang, O. Godet, J.-L. Atteia, M. Brunet, S. Guillot (IRAP), M. Pillas (IAP), L. P. Xin, Y. N. Ma (NAOC)

Using the event-by-event data downloaded through the X-band ground stations, we report on the identification of a faint SVOM/ECLAIRs transient SVOM J2320.0-2901 detected at 2025-11-05T13:00:48.34 UTC (T0), 88.4 s after the compact binary merger candidate S251105aj (The LIGO-Virgo-Kagra Collaboration, GCN 42587). This transient was detected through an offline targeted search for possible counterparts of the GW event S251105aj.

SVOM J2320.0-2901 was detected with a timescale of 82 s and below 60 keV, with a best signal-to-noise ratio of 6.1 starting at T0.

The localization of SVOM J2320.0-2901 is RA, Dec = 349.998, -29.022 degrees:

RA (J2000) = 23h20m00s
Dec (J2000) = -29d01m19s

with a 90% C.L. radius of 13.9 arcmin (including a systematic error of 6 arcmin added in quadrature). This position is about 2 degrees outside the 99% area contour of the Bilby.multiorder.fits skymap of S251105aj. At the time of the GW trigger, ECLAIRs was covering 88% of the skymap 99% area.

The time-averaged spectrum from T0 to T0+82 s in the energy range of 5-60 keV is well fitted by a blackbody (BB) model, with a measured temperature of 7.8 (+1.5/-1.2) keV. With this model, the total 4-120 keV flux is (3.6+/-0.8)e-9 erg/cm^2/s. Assuming a distance of 2071 Mpc (z=0.374) for the source, this corresponds to a luminosity of 1.8e48 erg/s and a BB emission radius of 1.9e6 cm.
A broken power-law model is also tested, providing a comparable fit, though with less well-constrained parameters of photon index 1 around -0.5, break energy of 22 (+21/-10) keV, and photon index 2 around 2.9.

At this stage, the nature of SVOM J2320.0-2901 is unknown.

We conducted SVOM/VT and EP/FXT follow-up observations on this field. The results will be published in dedicated circulars.

All the quoted errors are at the 68% confidence level.

The Space-based multi-band astronomical Variable Objects Monitor (SVOM) is a China-France joint mission led by the Chinese National Space Administration (CNSA), French Space Agency (CNES), and the Chinese Academy of Sciences (CAS), which is dedicated to observing gamma-ray bursts and other transient phenomena in the energetic universe. ECLAIRs was developed jointly by CNES, CEA-IRFU, CNRS-IRAP, CNRS-APC.

The SVOM/ECLAIRs point of contact for this source is: Hui Yang (IRAP) (hui.yang@irap.omp.eu).

NLP pipeline for Astro-COLIBRI

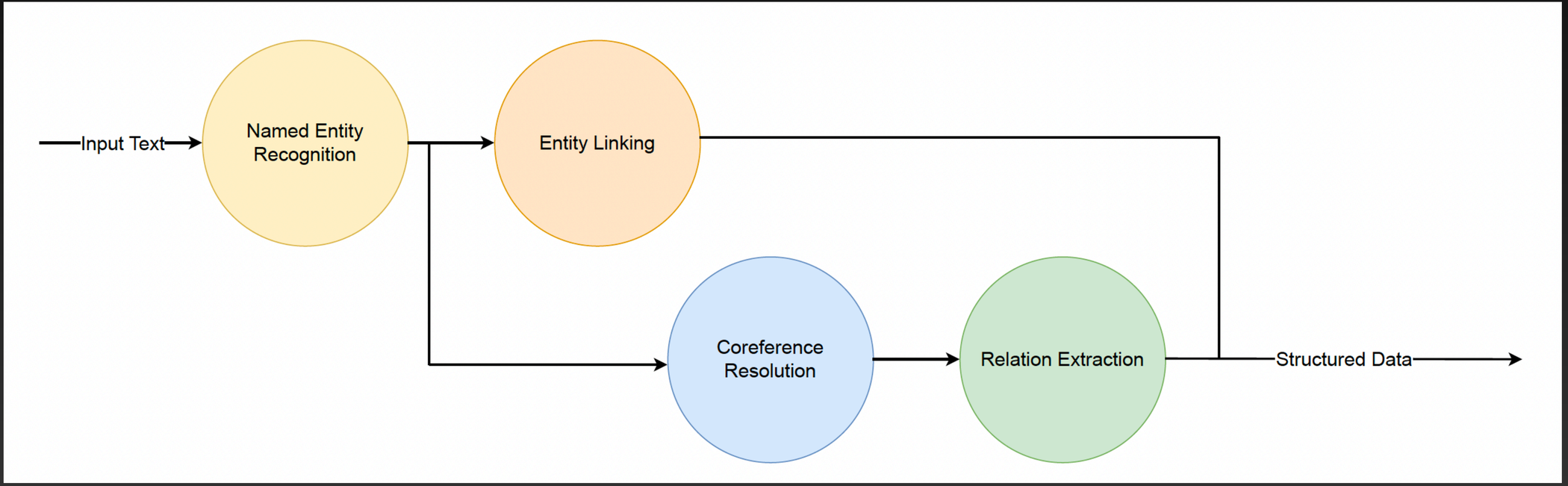
The Chandra X-ray Observatory imaged the field of GRB 991216 for 10ks starting on Dec 18.208 (UT), i.e. about 37 hrs after the GRB (Kippen et al. GCN n. 463). From a preliminary analysis of the data we found a single unknown point source, that we name CXO J050931.4+111706, in the center of the field. The position is RA = 05h09m31.35s, DEC = 11d17'.

Celestial Object	Observatory	Date	Coordinates	Citation
CXO J050931.4+111706	Chandra X-ray Observatory	Dec 18.208 (UT)	RA = 05h09m31.35s, DEC = 11d17'	Kippen et al. GCN n. 463
GRB 991216	...	...	...	...

NLP pipeline for Astro-COLIBRI

PhD thesis of Atilla Kaan Alkan (2021-2024; joint supervision FS + P. Zweigenbaum LISN)

Dedicated, annotated corpus « astroECR » => Fine tuning of the SciBert + astroBERT models => prototype for a complete information extraction pipeline



Alkan, Atilla Kaan, F. Grezes, C. Grouin, F. Schussler, and P. Zweigenbaum. "*Enriching a Time-Domain Astrophysics Corpus with Named Entity, Coreference and Astrophysical Relationship Annotations*". LREC-COLING 2024
https://aclanthology.org/2024.lrec-main.545/

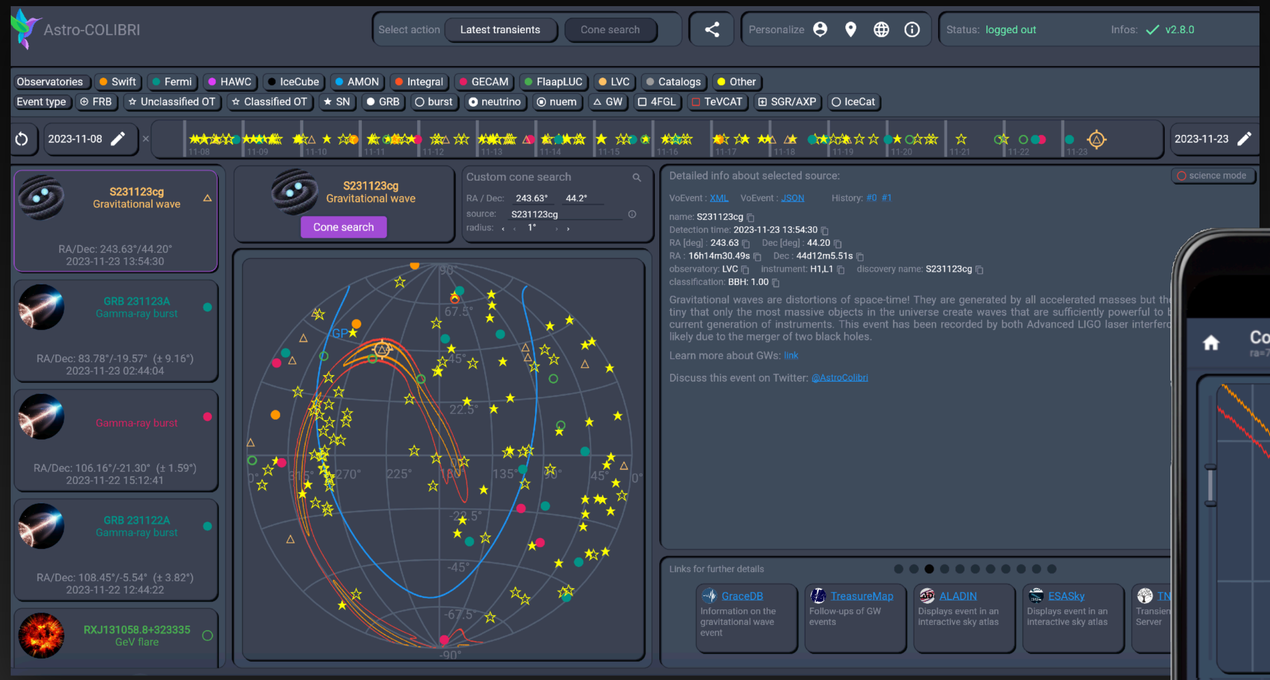
LLMs @ Astro-COLIBRI

- Prototype NLP pipeline for information extraction from observation reports
  - Aim: replace current tools based on regular expressions
  - Rapid evolution of the field over the last years
    - Upgrade to recent LLMs + extensive real-life testing + deployment pending

- Short summary text of each event (target audience: general public)
- Automatic translation of posts in our discussion forum
- Podcast discussing recent papers (NotebookLM => Astro-COLIBRI @ Spotify, etc.)
- Coding support (e.g. unit + integration tests)

Astro-COLIBRI

https://astro-colibri.com



https://astro-colibri.science

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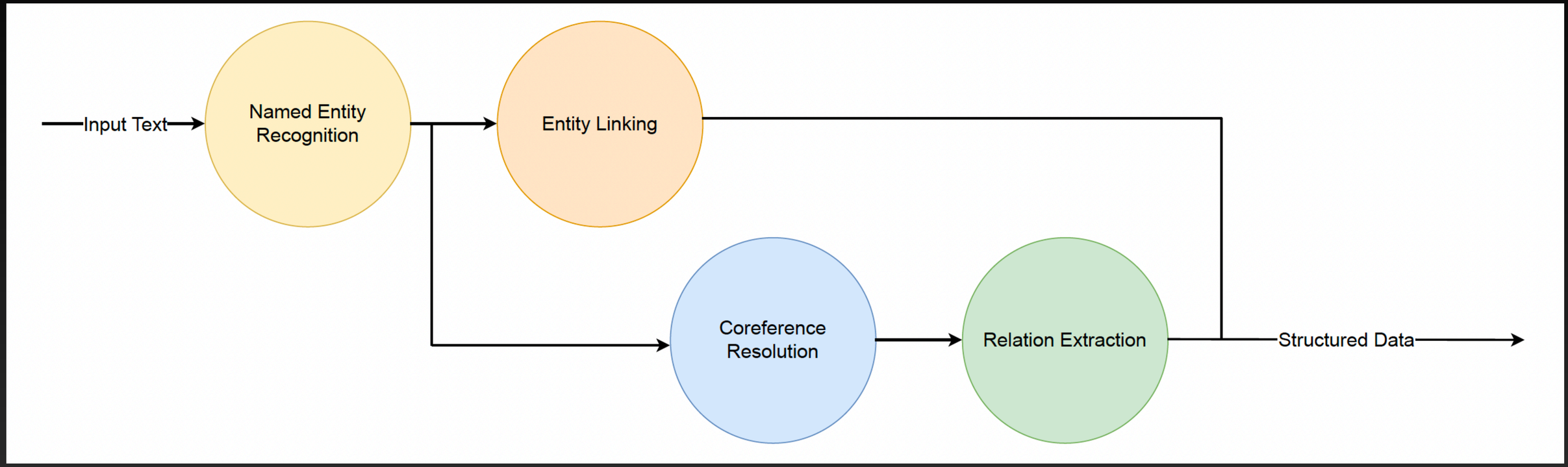
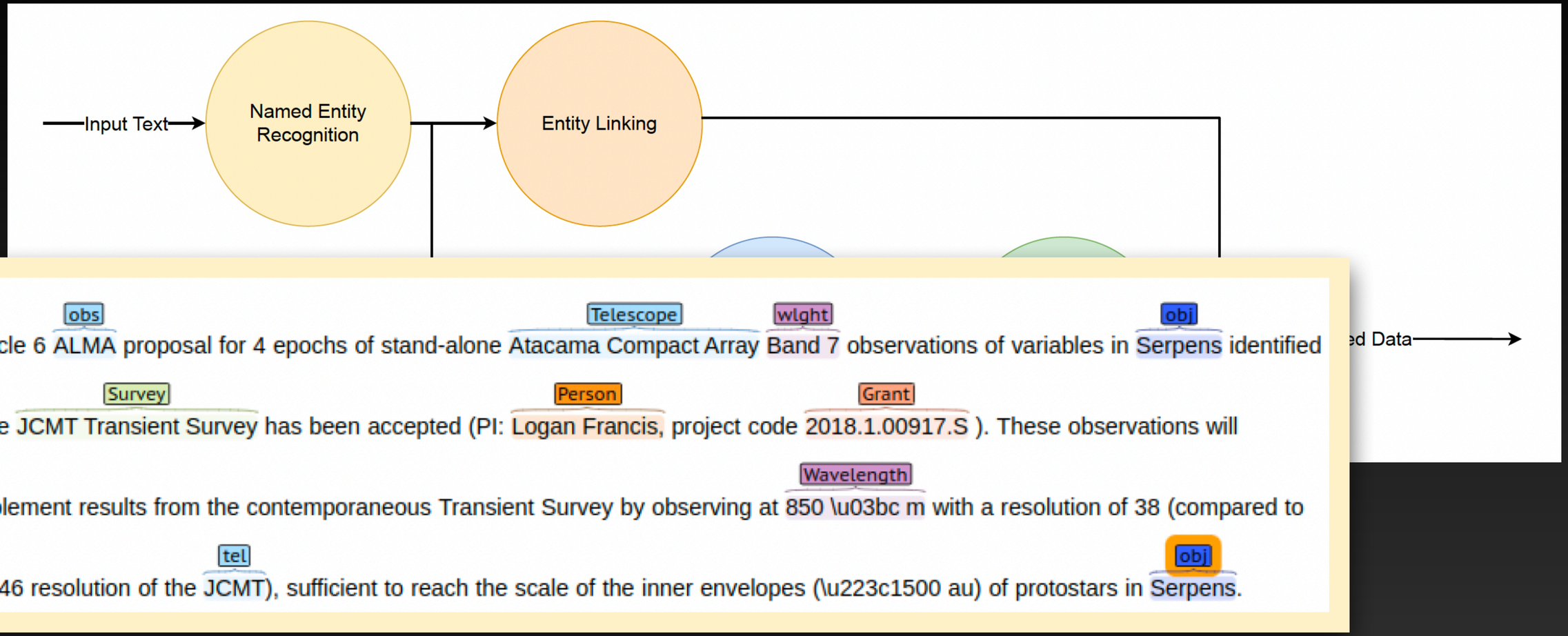
NLP pipeline for Astro-COLIBRI



- Alkan, Atilla Kaan, F. Grezes, C. Grouin, F. Schussler, and P. Zweigenbaum. "*Enriching a Time-Domain Astrophysics Corpus with Named Entity, Coreference and Astrophysical Relationship Annotations*". LREC-COLING 2024, https://aclanthology.org/2024.lrec-main.545/

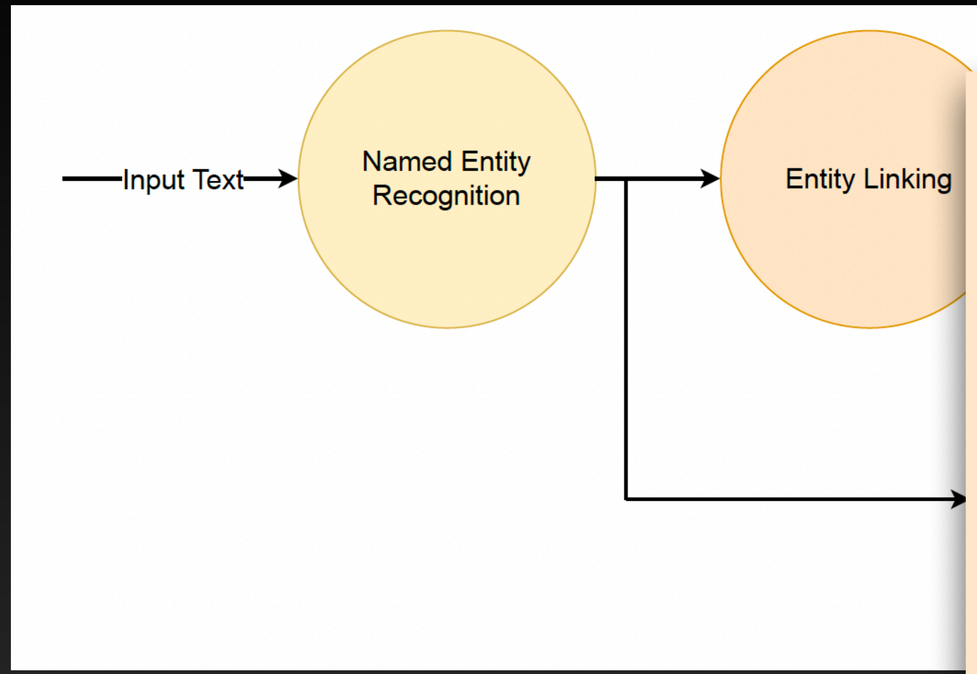
- Alkan, Atilla Kaan, C. Grouin, F. Schussler, and P. Zweigenbaum. "*A Majority Voting Strategy* of a SciBERT-based Ensemble Models for Detecting Entities in the Astrophysics Literature". First Workshop on Information Extraction from Scientific Publications, Association for Computational Linguistics, https://aclanthology.org/2022.wiesp-1.17

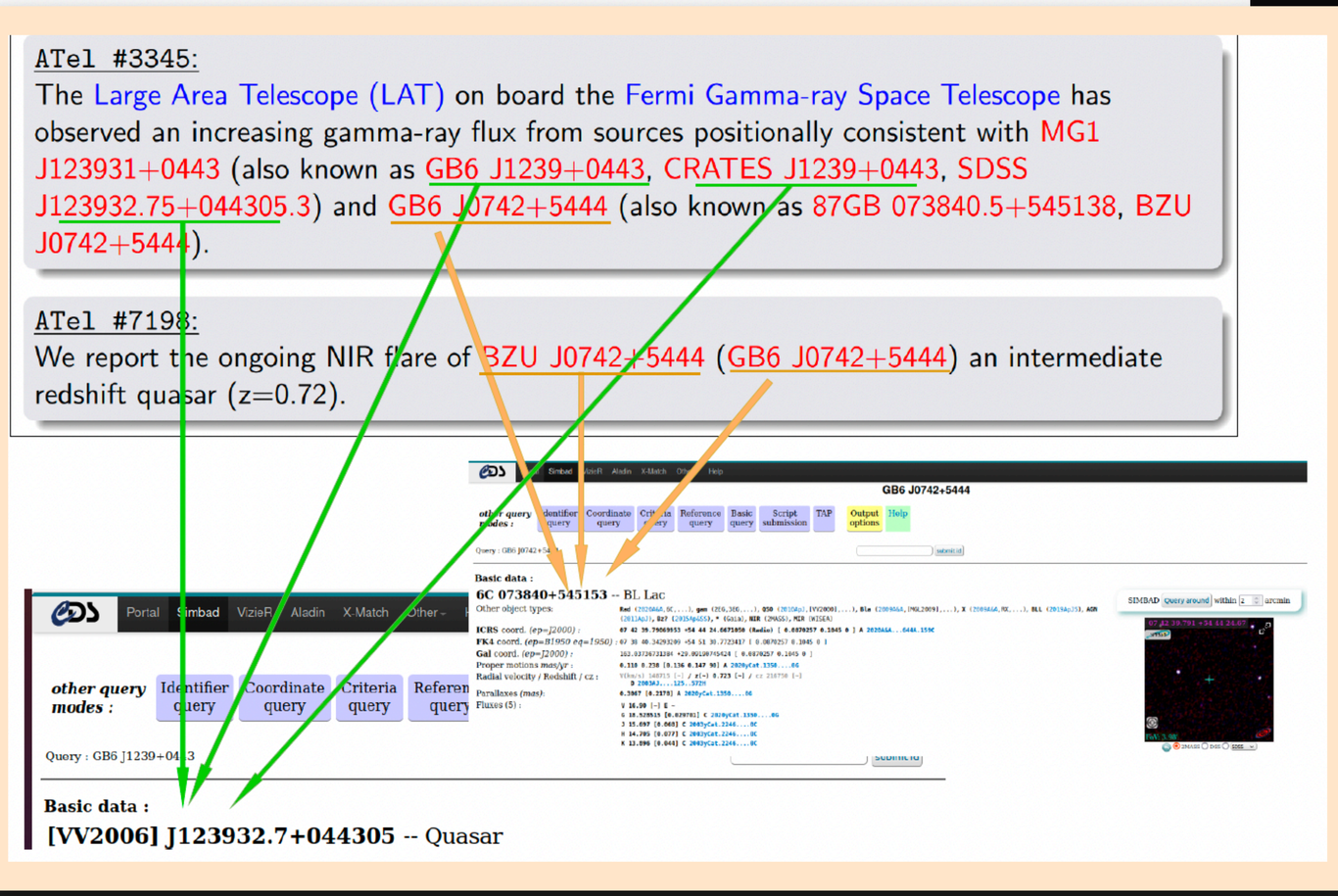
Named Entity Recognition



- recognize a list of predefined concepts (celestial objects, astronomical facilities, physical properties, people, organization etc.)

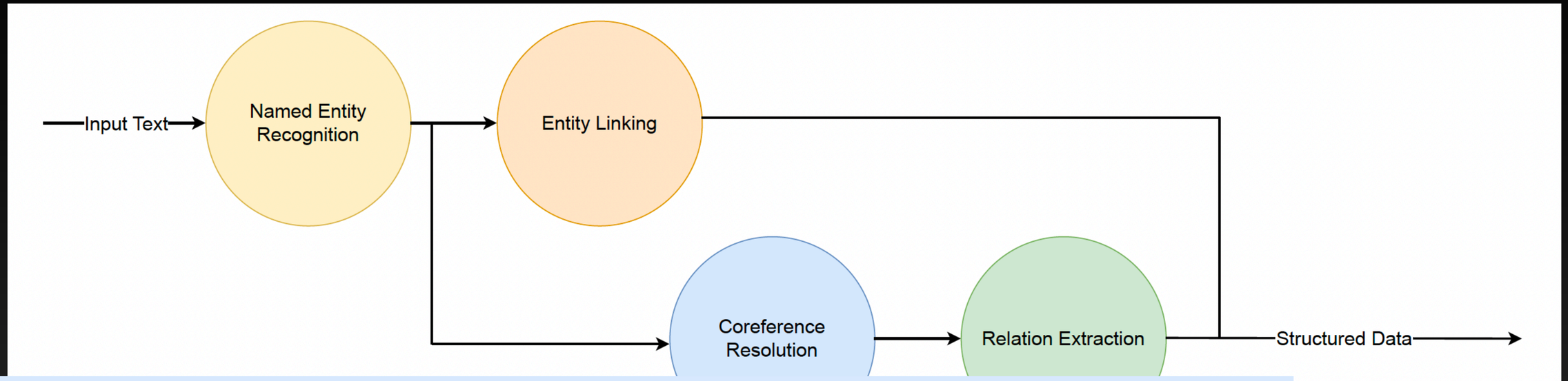
Entity Linking





- Disambiguating named entity mentions by linking them to the corresponding entries in a knowledge base.

Coreference Resolution



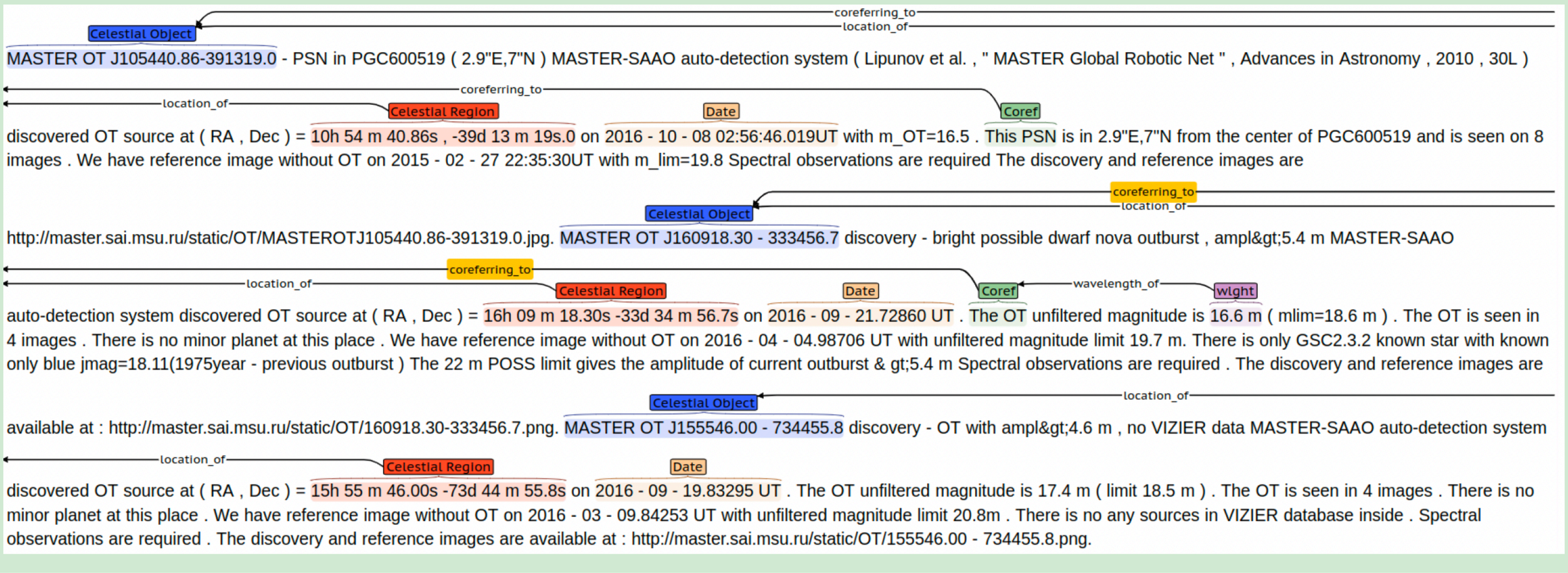
We discovered PS19did (*AT2019khq*) on MJD 58666.31 = 2019-07-02.31, at w = 19.9 +/- 0.1 [...] *The new transient source* is in the galaxy UGC 11003 [...] Followup observations of *this intrinsically faint transient* are encouraged.

...

A spectrum was obtained of the possible supernova in 2MASX J11200680+3407396 with the 1.82-m Plaskett telescope [...] Adopting *the host galaxy* redshift z=0.03566 (NED) yields an expansion velocity...

- Identify and group all mentions referring to the same entity

Relation Extraction



- Extracting semantic relationships between two or more entities

LLM based event summaries