A creative intelligence tool for journalists

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JECT.AI is a research-based digital tool that was developed to augment journalist creative thinking. It integrates natural language processing, creative search and interactive creative thinking guidance to support journalists to discover novel ideas, angles and voices when writing new articles. This technical demonstration paper summarises *JECT.AI's* architecture, algorithms and key interactive features.

CCS CONCEPTS • Human-centered computing~Human computer interaction (HCI)

Additional Keywords and Phrases: digital creativity support, news, journalists, journalism

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1 creative intelligence tools for journalists

Journalism involves the search for and critical analysis of information.[6] How journalists discover and select sources of this information is important, to avoid bias, to be credible and trusted, and to create angles with which to generate new stories of value to readers. Journalist creative thinking, to discover and generate new associations during this search and analysis of information, contributes to the generation of new articles and stories.

Journalists are known to seek opportunities to develop new creative skills with which to discover information [5]. However, discovering and examining information sources about complex stories takes time – time that journalists increasingly lack as news organizations reduce staff numbers [9]. One potential means of providing new creative skills and information sources from which to discover sources in digital creativity support. However, at the moment, few such tools exist. In response, the authors researched and developed a new tool called *JECT.AI* to support journalists to discover new content, angles and voices more effectively [4].

2 The *JECT.AI* tool

JECT.AI is a research-based tool designed to augment the abilities of journalists by automating the discovery of novel content, angles and voices for new articles. It is a co-creative AI tool (e.g., [3]) that implements machine intelligence to augment human creative thinking. To deliver this intelligence, it integrates natural language processing, multi-language creative search and interactive creativity guidance to discover information in published news articles, then to support journalists to form new associations with this information during creative thinking [4]. It is implemented to be used by journalists with different client applications, including as sidebar plug-ins to text editors such as *Google Docs*, *Wordpress* and *Adobe InCopy*, and to the *CUE* content publishing platform [10] used in newspapers such as *Die Welt* and the *New York Times*. It is designed to contribute to journalist engagement in professional-level creative work, i.e., work that generated income and provided them with a living [2], and so is evolving into a commercial product.

3 The *JECT.AI* architecture

JECT.AI is implemented with the three-tier architecture shown in Figure 1. The interaction layer is a webpage or a text editor sidebar designed to fit with existing work practices. The application layer is composed of different machine-reasoning services designed to generate large numbers of possible associations between information that journalists are writing about using indexed news content from published articles. These services retrieve the content from *JECT.AI's* data layer, called the *Creative Content Index*, which is designed so that the *Discoverer* service can undertake different forms of creative search of it. The index is populated by the *Presser* service, which indexed millions of verified news stories as possible starting points for discovering novel angles for new articles. It is used to generate rich news landscapes that correspond to what journalists are writing about. It is composed of terms describing from over 23million articles published over the last 4 years in 8 different European languages, as well as from 175,000 scientific articles published in English. The *Text processor* service was invoked by the *Presser* service to make sense of and generated indexed content from published news, and by the discoverer to expand creative search queries.

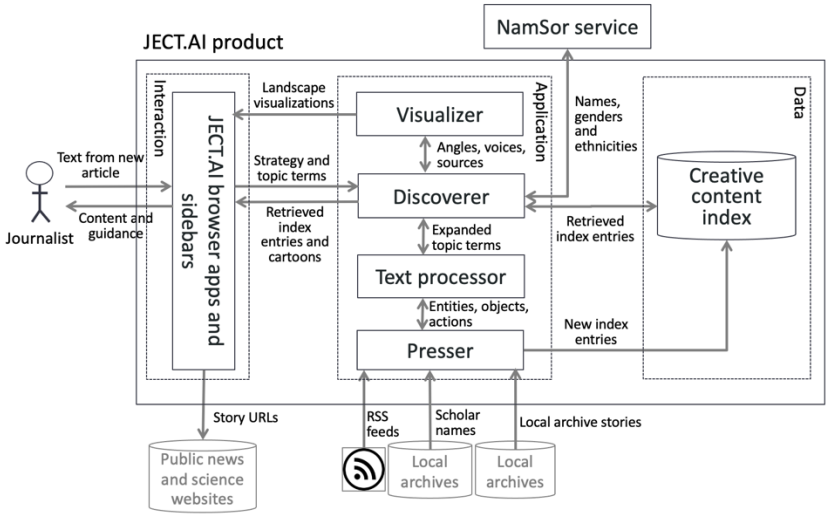

Figure 1. The JECT.AI product's three-tier architecture, showing its layers, external services and external information sources

4 How *JECT.AI* supports journalist creative thinking

An example of *JECT.AI's* interactive guidance to journalists is depicted in Figure 2. A journalist starts a session by entering natural language terms describing the topic of interest (e.g., "*Venice Italy floods*") into the top search bar. In response, *JECT.AI*'s application-layer services automatically generate guidance to augment the journalist's creative thinking about the topic. The journalist can direct this guidance using interactive features shown beneath the search bar that control the, e.g., strategies (e.g., *evidence-based* or *human angles*), time periods (e.g., *over the last month* or *year*), and types of information to manipulate (e.g., *published news sources* or *scientific publications*). It then presents its computed guidance according to the selected strategies using different interactive cards depicted in Figure 2.

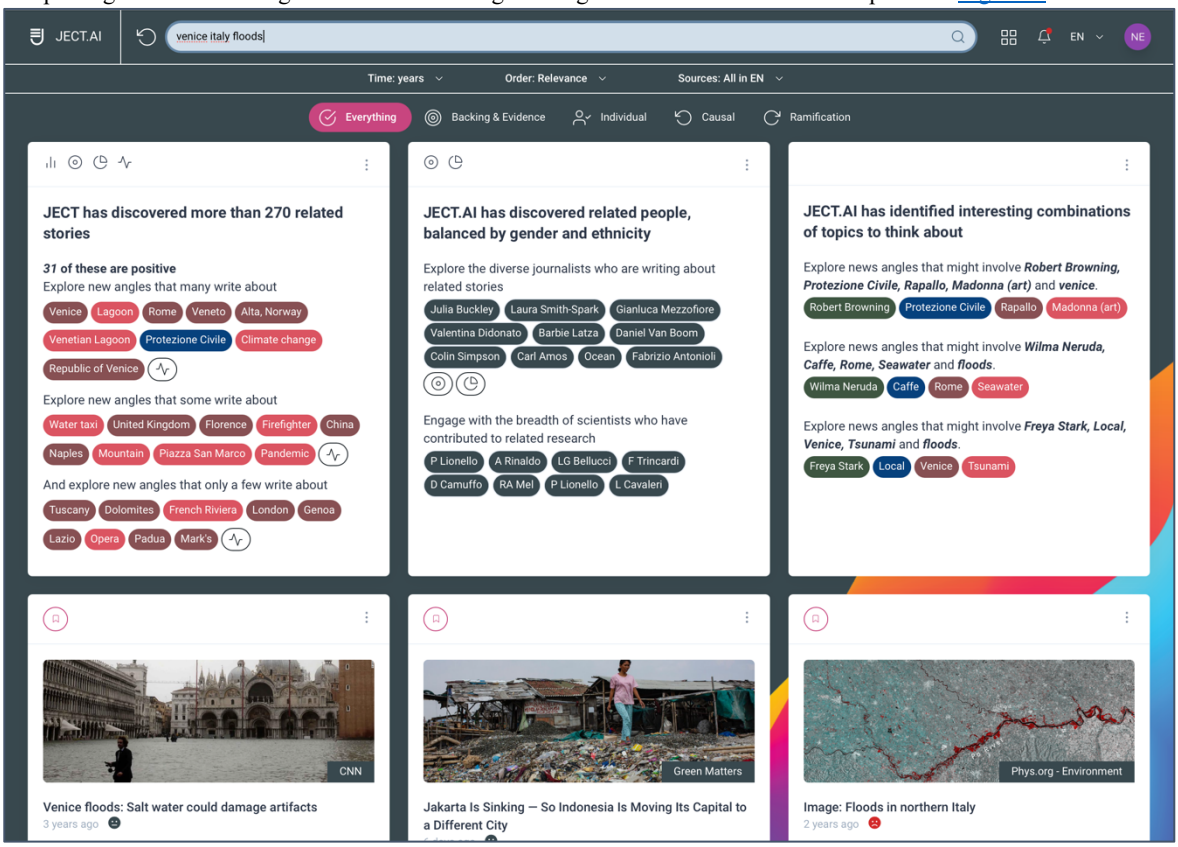

Figure 2. The JECT.AI tool showing the creative guidance generated for the topic term Venice Italy floods. The top row cards, from left to right, are the landing card, intelligence card and combination card. Second row cards are different individual news cards

4.1 The landing card

The landing card presents different possible angles on the topic – *Venice Italy floods* – generated from a news landscape discovered for the entered topic terms. It reports the total number of discovered articles out of a sample total of up to 500, those that are rated to have positive sentiment, and the angles covered in most discovered articles (e.g., *Venice*, *lagoon*), some of these articles (e.g., *water taxi*, *Florence*), and just a few of these articles (e.g., *Dolomites*, *French Riviera*). The angles that only a few write about represent the ones with the greatest creative potential.

If the journalist clicks on one of these angles, *JECT.AI* presents sets of automatically-generated creative ideas that the s/he can use to discover more specific ideas based on the angle. Figure 3 shows how *JECT.AI* responds to clicking on the *lagoon* angle. The pop-up on the left-side presents three machine-generated ideas. E.g., asking *what is essential about the lagoon* could lead the journalist to explore Venice's water ecosystem, while asking about the *timing of the lagoon* could encourage the journalist to explore the importance of daily tides. Each idea is also a hyperlink that, if clicked, launches a tailored Google search for information related to that idea in a new browser tab. Finally, if the journalist clicks the *Explore More* option, the larger pop-up shown in Figure 3 presents a definition of the angle based on Wikipedia content, then up to 5 already-published news articles that report both the selected angle and entered topic terms. The title of each of these articles is also a hyperlink that will open directly at source in a new browser tab if clicked.

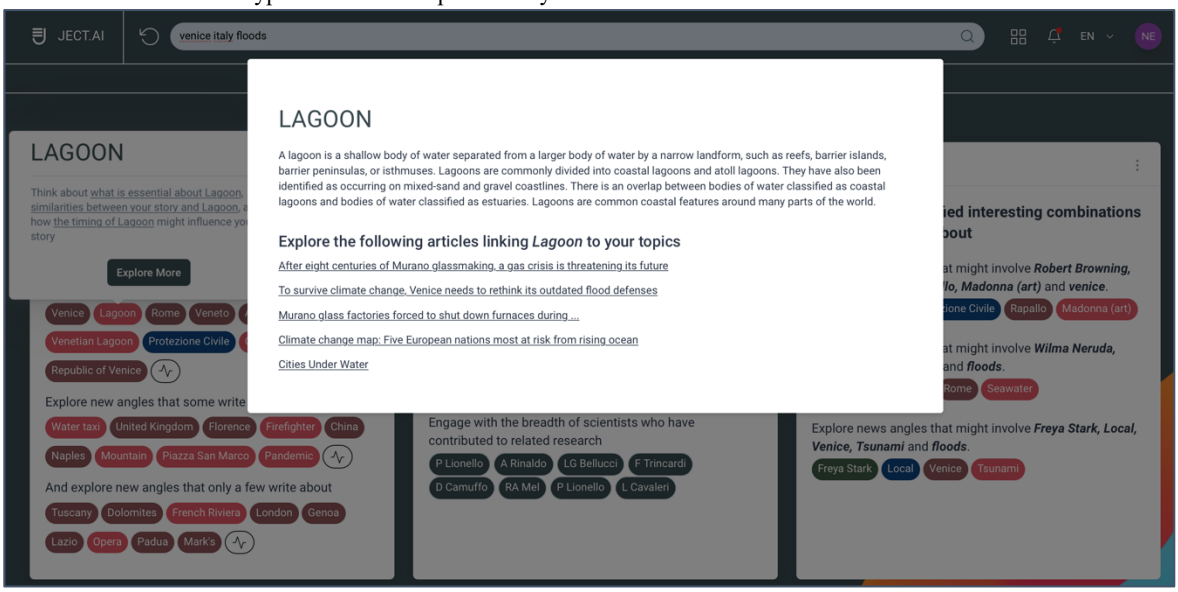

Figure 3. Different journalist interactions with the landing card to provide directed creative guidance on one or more discovered angles

JECT.AI also presents different forms of information visualisation to communicate different perspectives on each discovered news landscape. Figure 4 depicts how the frequencies of reporting of different angles discovered in the news landscape change over time. The example reveals different peaks of coverage that correspond to periods of flooding in Venice that might direct the journalist to write about e.g., periods in Venice without flooding.

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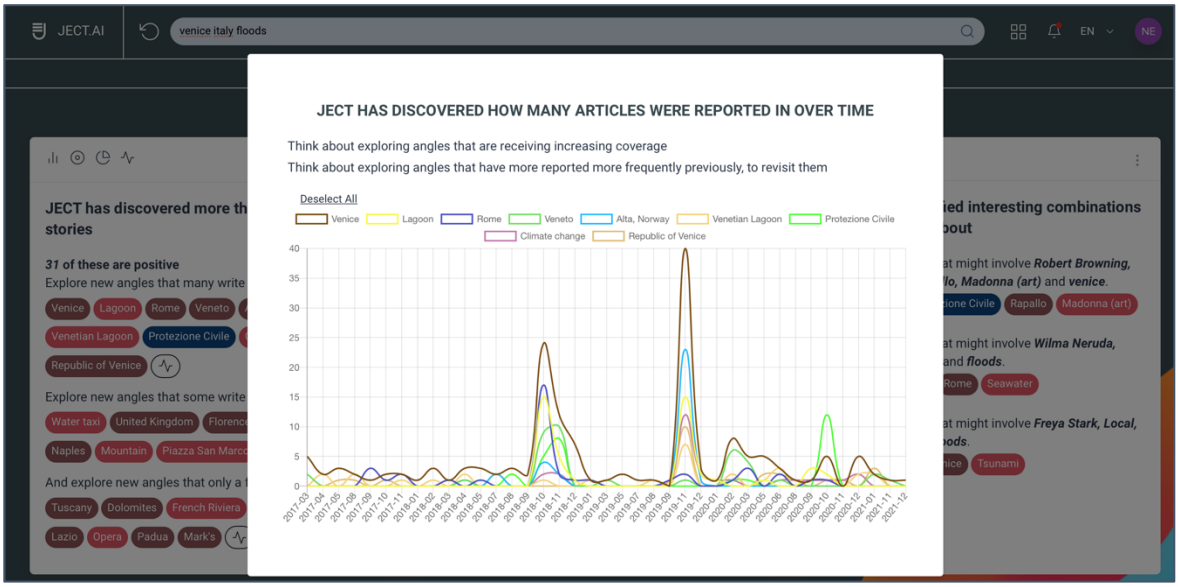

Figure 4. A machine-generated visualisations of news landscapes, showing frequencies of reporting of different angles over time

Figure 5 depicts the average sentiment of the discovered articles over time, and reveals that most news coverage is negative. In response, the journalist could develop more positive articles that report how the flooding is being resolved.

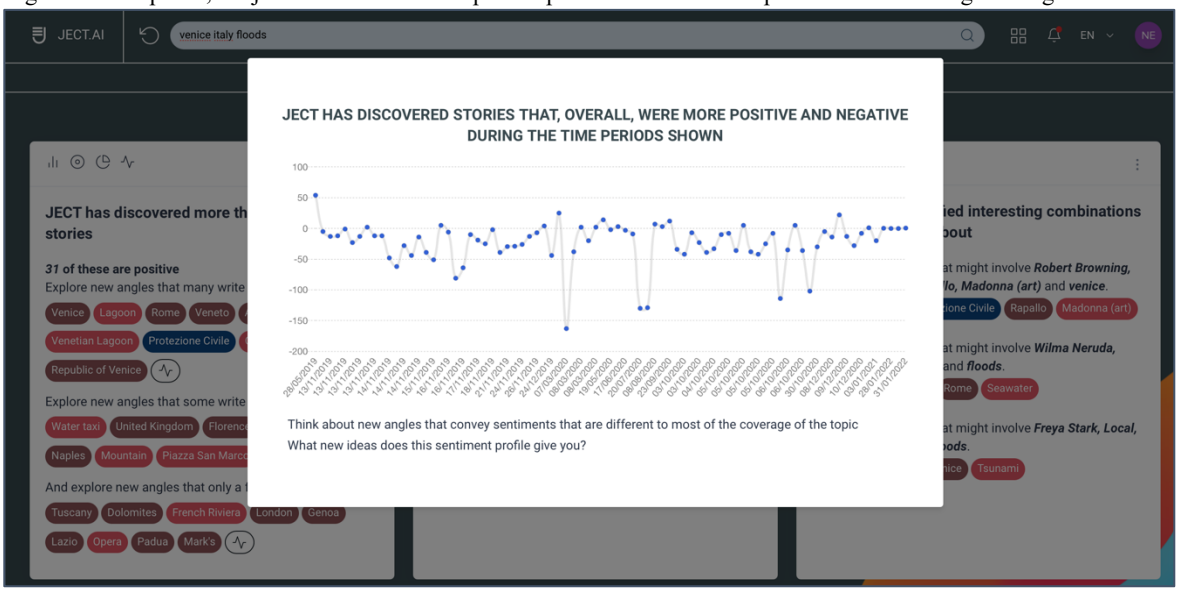

Figure 5. A machine-generated visualisations of news landscapes, showing and average sentiment of the discovered published articles over time

4.2 The intelligence card

The intelligence card supports journalists to discover new voices discovered in the news landscape to write about in articles. It presents the names of up to 20 journalists who have published articles and up to 20 scientists who have published scientific papers. A bespoke *JECT.AI* algorithm extracts proper names explicitly designated as author(s) in a discovered news article to provide an unordered set of names composed of first name and surname. The names of scientific authors are extracted from retrieved academic papers using SerpApi's Google Scholar service. The result is also an unordered set of names composed of first name and surname. If the journalist clicks on a presented name, *JECT.AI* presents a pop-up with the title of the publication as a hyperlink that opens the article or paper at source, see Figure 6. Clicking the *Explore More* option opens the journalist's online profile and scientist's Google Scholar page, to enable further creative searching.

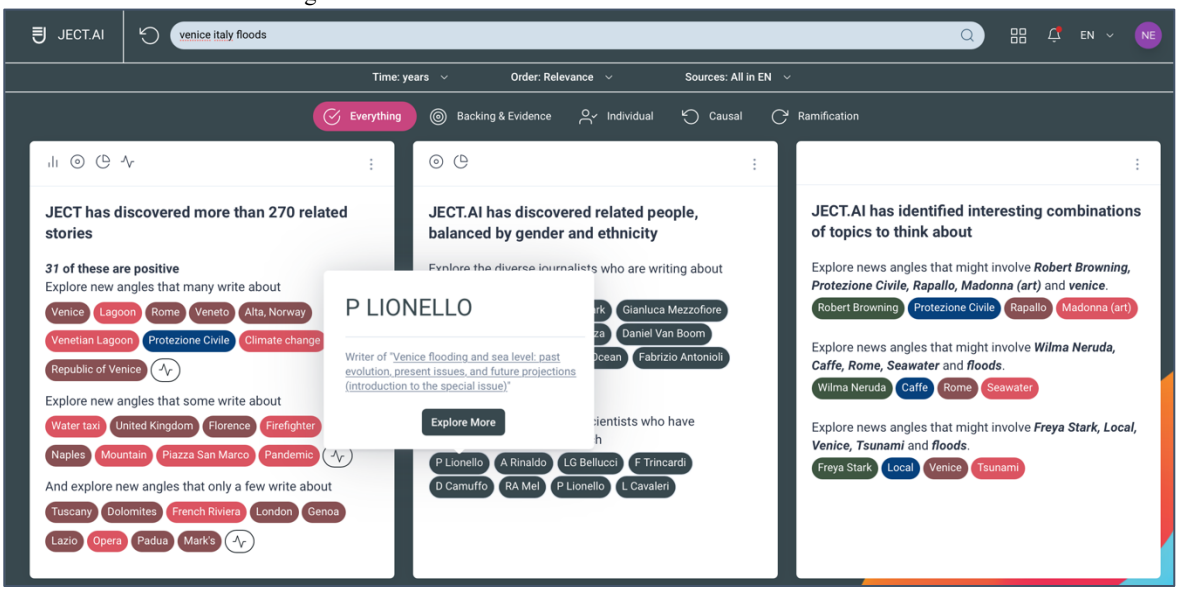

Figure 6. Interactions with the JECT.AI intelligence card

In addition, rather than list journalists and scientists according to relevance or number of publications, the intelligence card presents lists computed to have an equal number of both male and female first names and European and non-European surnames. Science reporting has continued to exhibit biases in both gender and ethnicity. Recent studies [1] have revealed that women continue to be quoted less often than men in high-profile journals, and that authors with non-British-origin names were significantly less likely to be mentioned or quoted than comparable British-origin named authors (e.g., [8]). The card is designed to counter these biases. Another third-party service called *NamSor [7]* attributes the probabilities of the gender and cultural origin of each name in each list using a dataset of over 5million names. Using the most probable gender and cultural origin of each name, the algorithm generates two lists, one of retrieved journalists and one of retrieved scientific authors. Each list is composed of equal numbers of female and male first names, and equal numbers of surnames that originated from Europe and names that did not. *JECT.AI* supplements these different information visualisations to communicate different perspectives of the discovered landscape of voices to enage with. E.g., Figure 7 shows a machine-generated pie chart of the ethnicities of different journalists and scientists writing about the flooding in Venice.

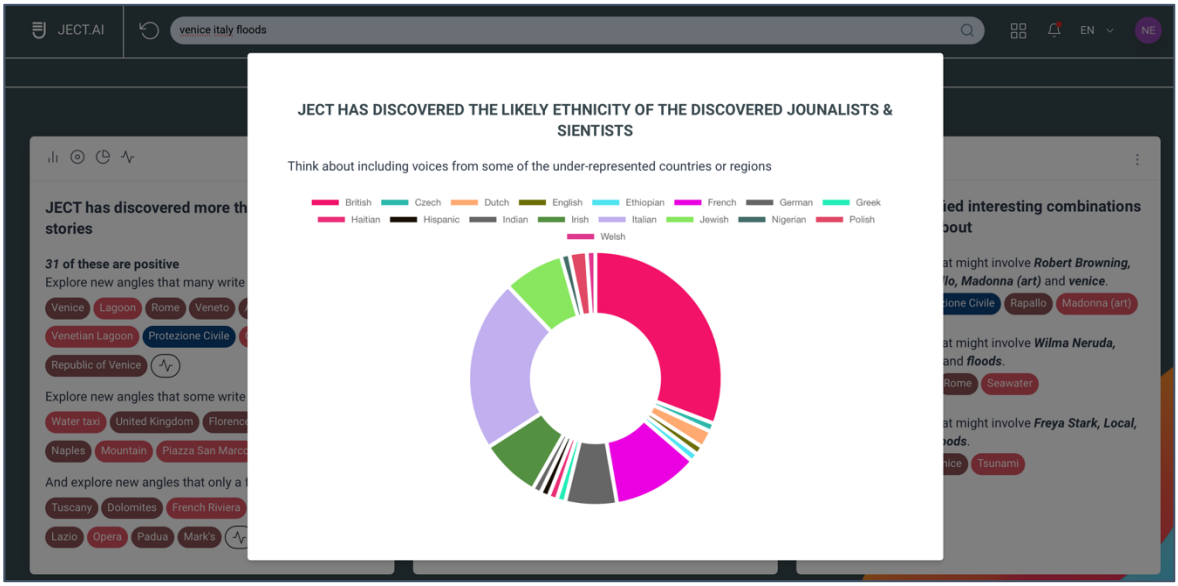

Figure 7. A pie chart generated by JECT.AI showing the ethnicities of different journalists and scientists writing about the topic of flooding in Venice

4.3 Indvidual news cards

Each individual article card presents content from one published article or paper in the news landscape. It presents the title, publication, date, summary text and automatically-generated angles that the s/he can use to discover new ideas, see Figure 8. As with the landing card, the journalist can click on an angle a pop-up of machine-generated ideas that are hyperlinks which, if clicked, launch tailored Google search for information related to that idea. Likewise, clicking the *Explore More* option presents a definition of the angle and up to 5 hyperlinked news articles that report both the selected angle and the topic terms.

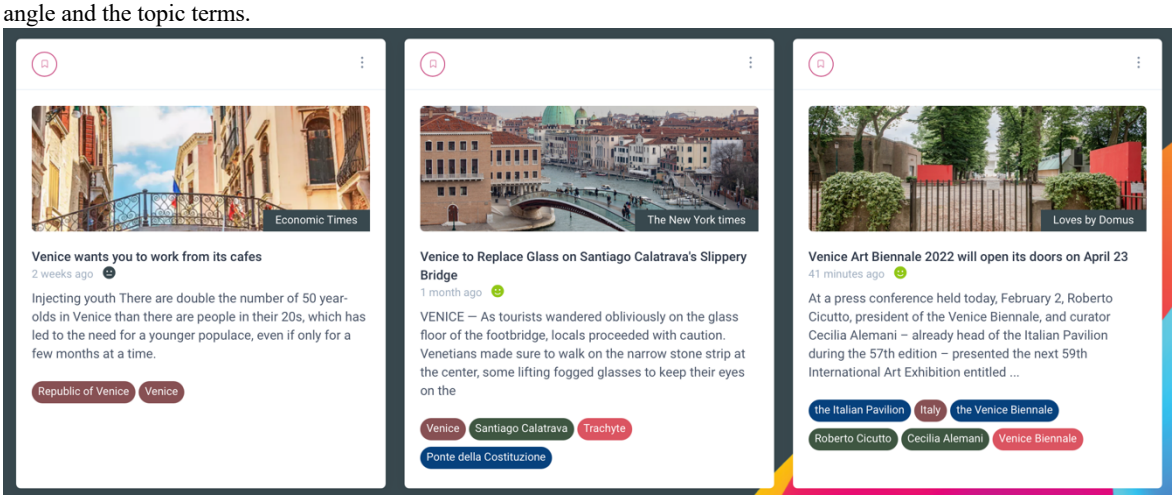

Figure 8. Three individual news cards providing creative guidance to journalists based on discovered published articles

4.4 Multi-language support

Furthermore, *JECT.AI* is implemented to support journalists working in different European languages including English, French, German, Norwegian and Greek. An example of this multi-language support in Greek is shown in Figure 9.

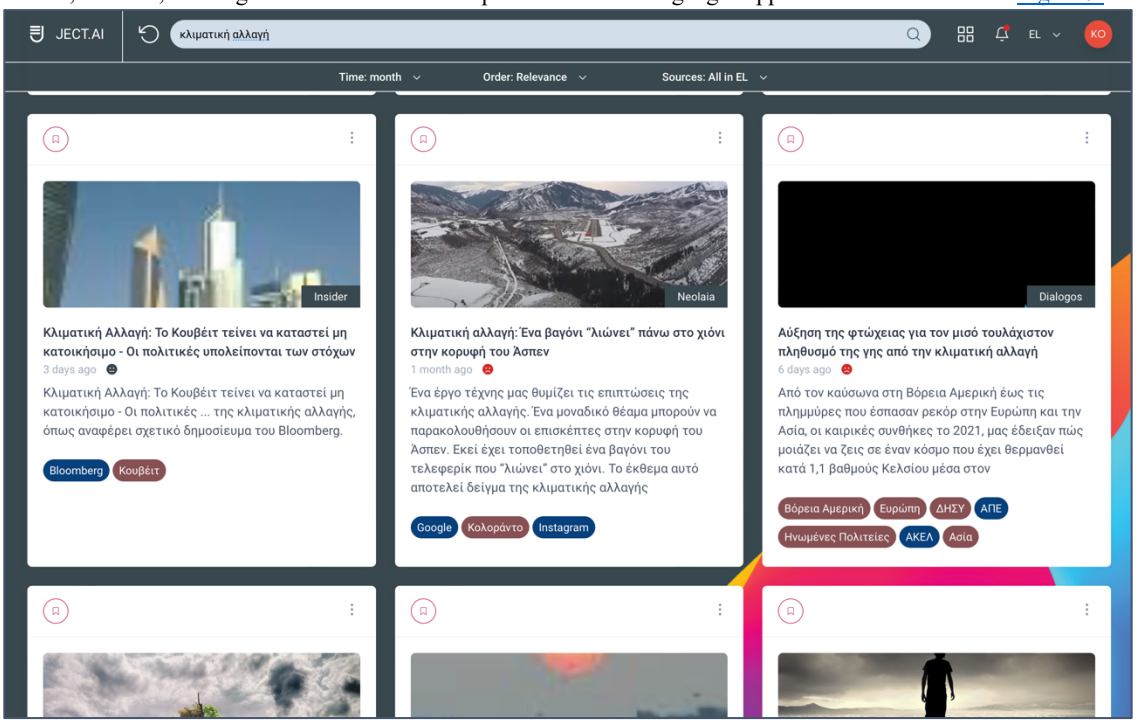

Figure 9. A journalist using JECT.AI in the Greek language

4.5 The text editor sidebar

Moreover, to fit with journalist workflows, *JECT.AI* is implemented as sidebar plug-ins to text editors such as *Google Docs*, *Wordpress* and *Adobe InCopy*, and to the *CUE* content publishing platform [10]. The plug-ins have limited screen real-estate, so each presents creative guidance generated for the landing and intelligence cards. Figure 10 shows examples of the *Wordpress* and *CUE* plug-ins.

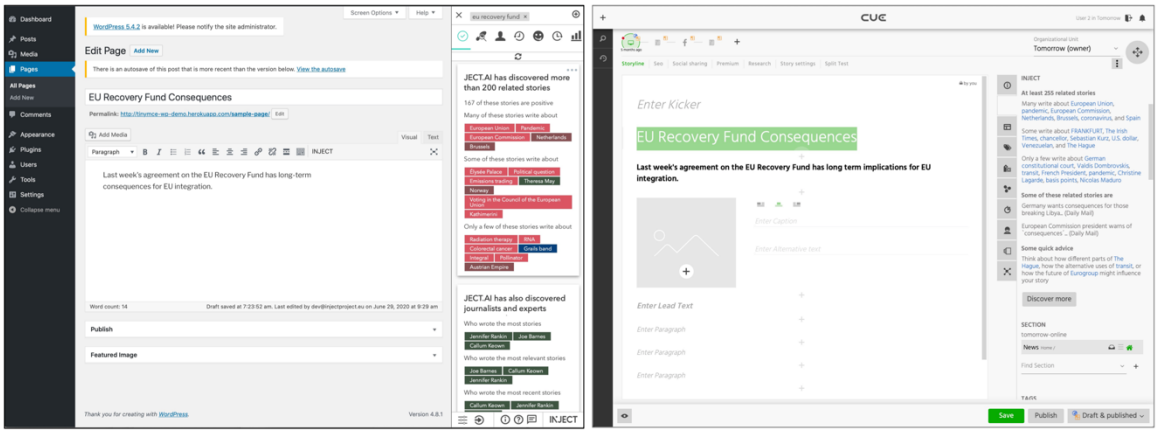

Figure 10. Examples of the Wordpress and CUE plug-ins of JECT.AI

5 Journalist *JECT.AI* use and next steps

The *JECT.AI* tool has been used in different newsrooms by journalists working in Norwegian [4] and Greek. Its current evolution towards a product is one of the first attempts to commercialise digital creativity support tools and address gaps identified in [11].

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