# Beyond the Noise: The Power of Pertinent Market Alerts

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## Summary

Financial markets are recognized as an efficient way to integrate new information into the price of stocks, commodities, and bonds. However, in our information-rich age, the timely detection of significant pieces of news which will trigger market reactions remains a challenge: overreacting to every piece of news is as unproductive as being a late follower.

In this paper, Causality Link presents a graphical method to understand, across a news flow, the timeliness of the detection of a new piece of information as well as its significance. We use it to demonstrate the quality of the Causality Link alerting system based on the concept of **novelty**.

The Causality Link novelty score system serves to identify and quantify emerging market trends by evaluating current discourse against a backdrop of historical data. The insights gleaned from this system enable users to spot potential market movements ahead of the curve, offering a predictive edge in strategy formulation.

## Introduction

In our digital age, the daily influx of information is overwhelming, leaving individuals and corporations alike grappling to discern vital from trivial. The modern world presents us with an irony: while data is abundant, the time and capability to extract meaningful insights from this deluge are scarce. In the finance sector, a myriad of articles, reports, and analyses provide a real-time pulse on companies, industries, and macroeconomic landscapes. But who has the time or capability to read and synthesize it all, especially when the stakes are high, and decisions need to be prompt and informed?

This reality creates the necessity for an efficient mechanism in the finance sector to alert market participants to potential movements in price. The challenge lies in identifying trends and changes relevant to specific portfolios or interests amidst the vast sea of data. This alert system should provide early detection of critical shifts, enabling market participants to stay ahead of the curve.

How can such pertinent alerts be generated? Through Natural Language Processing (NLP) technology we can now process and analyze vast quantities of textual information. However, the real task lies in pinpointing the "needles in the haystack"—the critical pieces of information that portend a shift or

trend. This is where the concept of **topic acceleration** becomes crucial: it's about finding topics that are gaining momentum rapidly, indicating a potential shift in market sentiment or focus.

Causality Link's approach to topic acceleration uses a "novelty" measure. This method compares the recent frequency of a concept in market-related discourse with its historical frequency. By doing so, it achieves two goals.

1. First, it highlights topics that are currently gaining traction compared to their usual discussion volume, indicating a potential shift in consensus sentiment.
2. Second, and more importantly, it allows for an apples-to-apples comparison of different concepts by leveraging this concept of "historical frequency."

It is a way to compare a sudden spike in discussions about a lesser-known company with a similar spike for a market giant like Apple. This comparability, achieved by measuring each concept against its own historical backdrop, is crucial for identifying genuinely novel and potentially impactful market developments.

## The Novelty Score

The novelty score is designed to measure the emerging significance of specific market concepts. The score is calculated as a ratio: the frequency of a concept's occurrence in recent days compared to its frequency over a longer, historical period. The outcome of this calculation is a value between 0 and 1. A score closer to 0 indicates that the concept has not been a focus in recent times, whereas a score approaching 1 suggests a recent surge in the concept's discussion.

However, simply counting the occurrences of words or entities or phrases falls short in providing meaningful insights. This is why our concepts go beyond the standard word entities detected and used in knowledge graphs. For example, "revenue" is an **entity**, while "Tesla revenue in China during Q3 2023" is what we call a **concept** or **indicator**. This is where the role of an **ontology**—a structured framework of terms—becomes vital. Financial and economic concepts can be expressed through a myriad of terms and phrases. An ontology helps in encapsulating this diverse linguistic range under unified categories.

For example, various terms like "net income" or "EBITDA" roll up under a broader category like "profit." To take the illustration a step further, "Audi net income" will roll up to "Volkswagen profit" since "Audi" is a subsidiary of "Volkswagen." This structured approach enables a more accurate and comprehensive assessment of market conversations, ensuring that all relevant discussions of concepts are captured, irrespective of the specific terminology used.

The novelty score can be computed for different types of market concepts. One approach is to focus on a combination of a company and a Key Performance Indicator (KPI), or a company and a specific event. This method assesses the novelty of specific aspects or occurrences related to a company, such as "Tesla Profit" or "FTX Scandal."

Another approach involves uncovering and examining a **causal relationship** between a KPI or an event (being a cause), and a target industry. In this case, the novelty score reflects the emerging significance of a broader market influence. For instance, in the case of analyzing the impact of rising interest rates in China on the automobile industry, the novelty score might capture individual statements discussing

specific companies like NIO or BYD. These isolated discussions, when analyzed through NLP, can be effectively generalized to their respective industry categories. This methodology enables the system to aggregate various individual company mentions into a collective industry perspective.

Thus, instead of merely reflecting the impact on a single entity, the novelty score provides a more comprehensive view, capturing how a macroeconomic factor like interest rates is shaping the narrative and sentiment around an entire industry. This approach offers a broader, more strategic understanding of market dynamics, crucial for informed decision-making in the finance sector.

## Novelty in Action

The Causality Link platform is a sophisticated analytical tool for market participants, especially tailored for asset and portfolio managers. Utilizing its advanced NLP algorithms, the tool systematically reviews a vast array of news articles and financial reports, extracting significant economic and financial concepts. Users can generate reports that not only showcase current trends but also allow for a retrospective view of the market by selecting a past date, thereby understanding the perception of market conditions at that specific time. The novelty score, a central feature of the tool, is dynamically calculated to highlight emergent discussions within an industry or related to specific KPIs or events, thus providing early alerts on potential market shifts.

*Figure 1: Example of Causality Link's novelty report for Airlines on Jan 22, 2020*
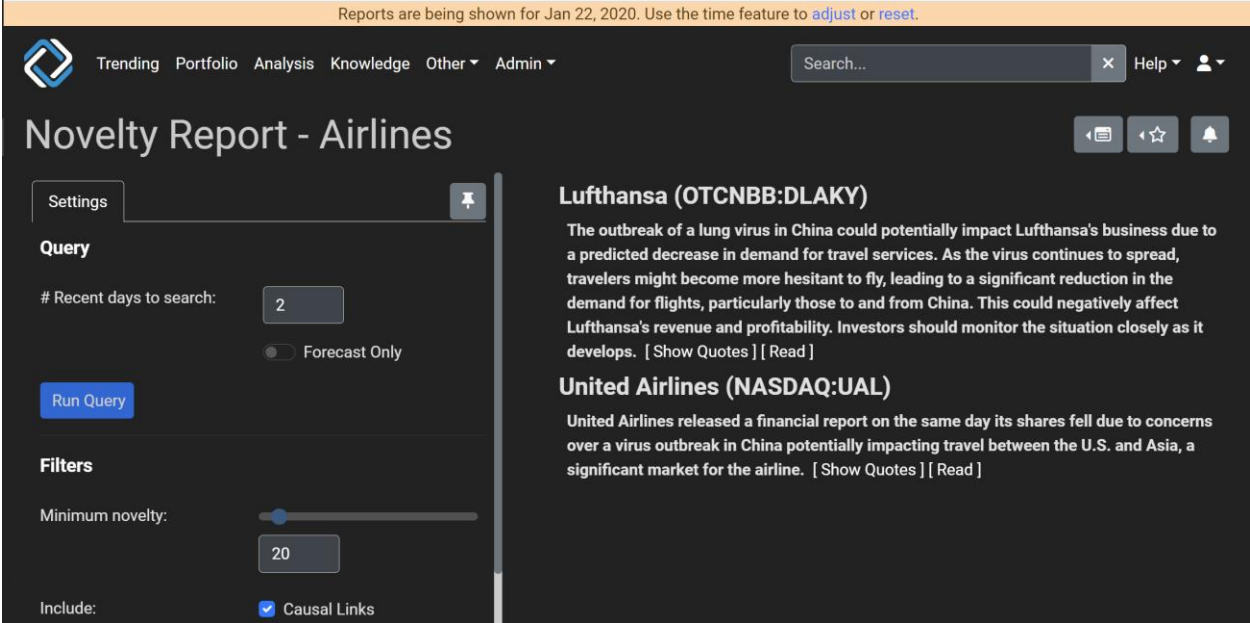


In practice, one of the key features of the platform lies in its ability to offer **timely and relevant alerts**. Asset and portfolio managers can customize their experience by subscribing to updates on specific industries or portfolios, with the option to receive these updates daily or weekly. The alerts can be

further refined to focus on particular KPIs or events, ensuring that users are notified about the most pertinent information that affects their investment decisions. For instance, as showcased in the example in Figure 1 from January 22, 2020, the platform was able to provide early warnings about the impact of the coronavirus on the airline industry, indicating the system's effectiveness in capturing crucial market signals ahead of wider recognition.

The business impact of such a tool can be substantial. By delivering early and actionable insights, the platform empowers financial professionals to make more informed and timely decisions, potentially leading to better risk management and capitalization on market opportunities.

The ability to look back in time and assess the novelty score on a historical basis also enables users to perform post-analysis, evaluating the accuracy and effectiveness of their decisions and the tool's predictive capability. Ultimately, this enhances strategic planning, improves investment outcomes, and may contribute significantly to the competitive edge in a rapidly evolving market landscape.

## Graphical Justification of Novelty

Causality Link employs visualization to track the emergence and relevance of market events. Alerts are visually represented in red on a timeline, where pre-alert news volume is marked in blue and post-alert volume in green. This allows for a direct comparison of news frequency before and after an alert, providing a clear indication of whether an alert corresponded with a genuine increase in market attention.

The system is designed to show alerts that exceed a threshold and filter out repetitive alerts. It only triggers a new alert if the topic wasn't already highlighted the previous day. This ensures that users receive notifications for fresh or intensifying discussions only, avoiding the redundancy of multiple alerts for the same ongoing event.

For example, the graphical evidence from the timeline of alerts on the demand for airline companies prior to COVID-19 demonstrates a significant escalation in post-mention counts following the alert. The minimum novelty is set to 10%, which requires current news to be 10 times as frequent as its historic pulse. The alert pattern indicates that the platform successfully detected a rising concern both for United Airlines as well as for Lufthansa, potentially offering a prescient warning before the wider market acknowledgment.

Note also that the repeated occurrence of the same alert should serve as an increasingly important warning, indicating a growing set of mentions of that specific alert.

*Figure 2: Timeline of alerts for airline demand prior to COVID-19*



Alerts on the demand for airline companies prior to COVID
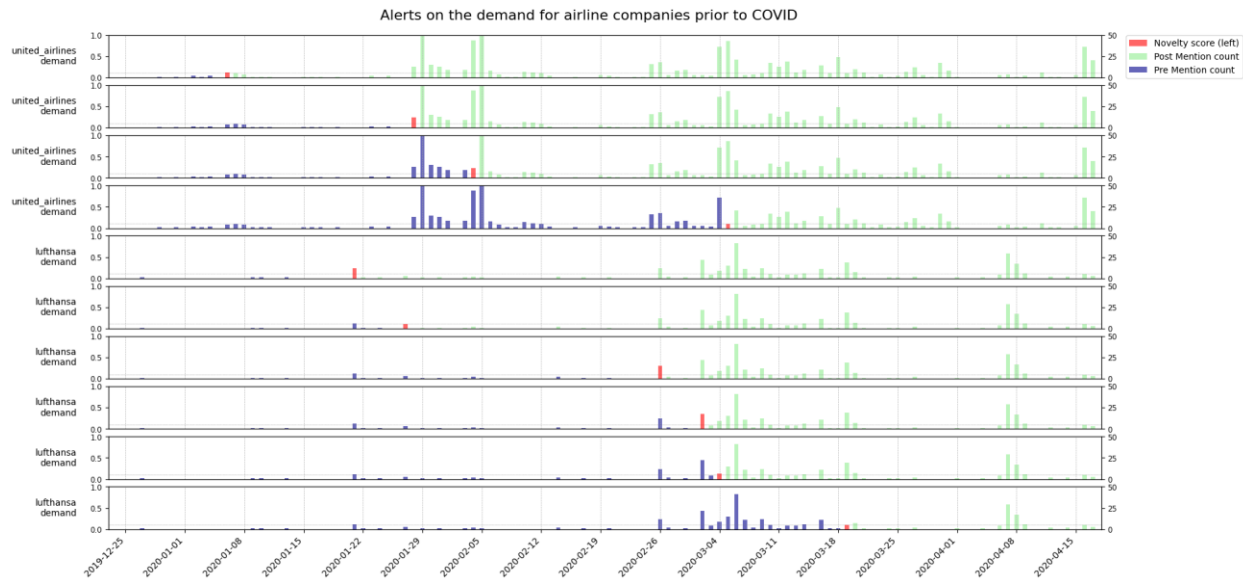
Note that all detections in the Causality Link system point back to the position in the document they originated from, and that it is always possible to ask for the original quotes, or texts, that enabled the novelty computation. In Figure 3, we present such quotes.

*Figure 3: Textual excerpts providing context to the alerts on airline demand*

| unit | feature | date | novelty | text |
|---|---|---|---|---|
| united_airlines | demand | 2020-01-06 | 0.11 | 2020-01-06 17H United Airlines suspended its direct flight between Buenos Aires and New York due to the drop in demand (Source: ContentEngine ) |
| lufthansa | demand | 2020-01-21 | 0.24 | 2020-01-21 17H The outbreak of the lung virus could significantly reduce the demand for services and especially for travel services, it was said. (Source: dpa Deutsche Presse-Agentur GmbH ) <br> 2020-01-21 15H The airline cannot use a dispute with the pilots if the economy slows down and therefore demand for flights. (Source: ProQuest Information & Learning) |
| | | 2020-01-27 | 0.10 | 2020-01-27 16H German airline Lufthansa, French luxury goods manufacturer LVMH and Gucci owner Kering have also fallen into concerns about a slowdown in Chinese demand. (Source: ContentEngine ) |
| united_airlines | demand | 2020-01-28 | 0.25 | 2020-01-28 23H In addition, United Airlines announced in a statement Tuesday the suspension of some flights from the US to Beijing, Shanghai and Hong Kong between February 1 and 8 due to a "significant decline in demand" for tickets. (Source: EFE News Service ) <br> 2020-01-28 23H The US airline United Airlines announced Tuesday that it will reduce its flights to China from the United States due to the huge drop in the demand for the epidemic of the new coronavirus, which already leaves more than 100 dead in the Asian country. (Source: ContentEngine ) <br> 2020-01-28 23H Citing a "significant decline in demand," United said it is suspending flights starting Saturday through Feb. 8 to Beijing, Hong Kong and Shanghai. (Source: Tribune Content Agency, LLC) |
| | | 2020-02-04 | 0.23 | 2020-02-04 23H The airline cited a drop in demand and said it would monitor the situation to see if additional changes were needed. (Source: USA Today ) <br> 2020-02-04 19H United Airlines announced the cancellation of a number of scheduled flights from US hubs to Beijing, Hong Kong, and Shanghai from 1 February anticipating lower demand due to the nCoV fears. (Source: Datamonitor ) |
| | | 2020-02-26 | 0.30 | 2020-02-26 17H Due to the current demand situation for flights to and from Hong Kong, capacity adjustments have already been made on this route, and additional frequency adjustments to and from Frankfurt, Munich and Zurich are planned. (Source: Information Solutions ) <br> 2020-02-26 15H The Group also announced further cancellations for connections to Hong Kong due to weak demand. (Source: dpa Deutsche Presse-Agentur GmbH ) |

Similarly, the visual data concerning the semiconductor supply shortage and its impact on the automobile industry showcases the platform's capability to detect critical shifts in market sentiment. The novelty scores are well ahead of the main awareness of the impact of the chip shortage on the automobile industry. This preemptive intelligence could offer market participants a strategic advantage by informing their decision-making process in a timely fashion.

*Figure 4: Timeline of alerts for semiconductor supply shortage and automobile industry*
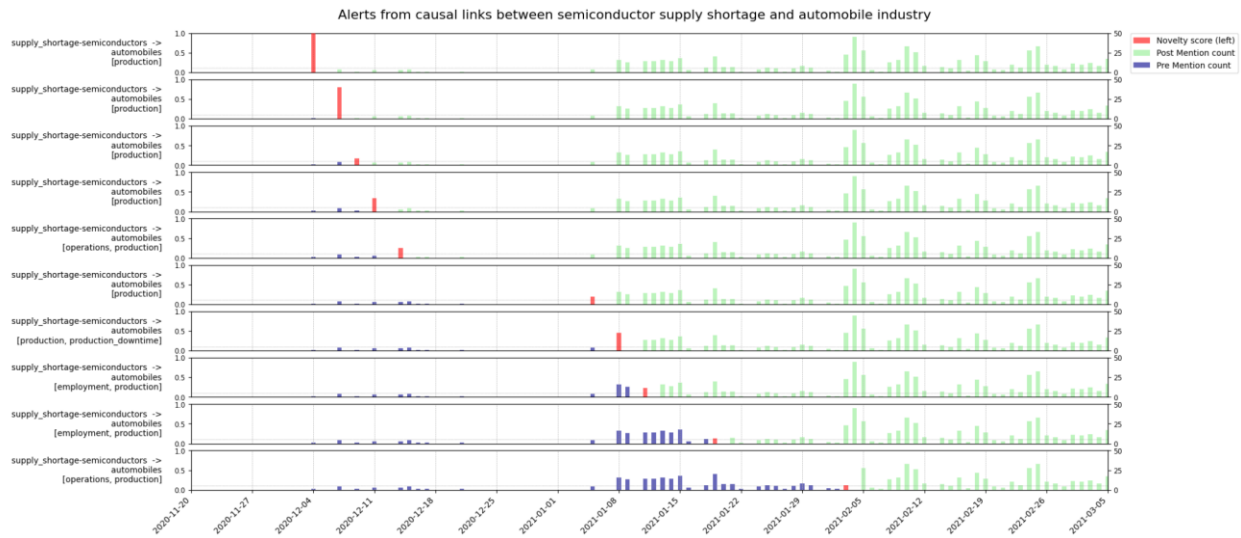
Again, our system offers full traceability for all of its alerts, first with a display of the relevant quotes, and then, if necessary, with a display of the full original article as shown in Figure 5.

*Figure 5: Textual excerpts providing context to the alerts on semiconductor supply shortage with source linkage*
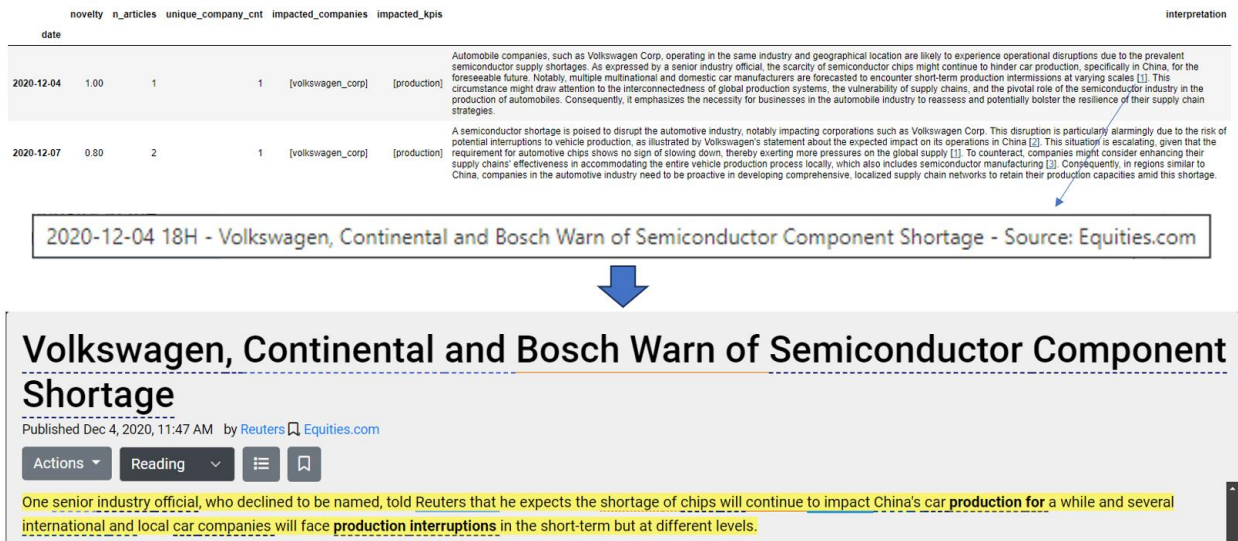


The text accompanying the charts clarifies the importance of detected trends for industry insiders. In the airline example, specific quotes that triggered the alerts are highlighted, illustrating potential impacts of the coronavirus on airline demand. Conversely, for causal link alerts, a large language model synthesizes various quotes and delivers a summary with references. This method, as depicted in Figure 5, ensures that users can trace summaries back to the original sources for further examination of alerted news.

The language model goes beyond summarizing; it evaluates how the information from the quotes could affect other businesses within the same sector, effectively providing a text-based **early warning system.**

This approach not only confirms the usefulness of Causality Link's alerts but also demonstrates their actionable value. The system equips investors with the ability to anticipate and respond to market trends proactively, offering a competitive edge in the dynamic world of finance.

## Conclusion

The retrospective analyses facilitated by the graphical display tool confirm the predictive value of the selected alerts derived from the "novelty score." By quantifying the increase in discussion volumes pre- and post-alert, Causality Link offers a transparent and measurable indicator of its effectiveness. Such capabilities are invaluable in a market where the early detection of trends can mean the difference between capital preservation and unwarranted losses.

## Contact Information

If you're ready to take the next step and harness the anticipatory power of Causality Link for your market strategy, we invite you to reach out for a free evaluation and/or a deeper dive. Discover how our platform can transform news or your texts into actionable insights. Contact us at info@causalitylink.com to schedule a demonstration and explore the full capabilities of our analytical tools.