# Product Overview


## Authors

Rama Sankisa

Jamie Stark

Xinyuan Liu

Product Management

## Contact Us

Americas
+1.212.553.1658
clientservices@moodys.com

Europe
+44.20.7772.5454
clientservices.emea@moodys.com

Asia (Excluding Japan)
+852.2916.1121
clientservices.asia@moodys.com

Japan
+81.3.5408.4100
clientservices.japan@moodys.com


# Credit Sentiment Score: An Introduction

## Background

Credit analysts have always used news to help understand and monitor their borrowers. But news volume has exploded in recent years, leaving many organizations complaining of information overload. Today, stakeholders can use artificial intelligence (AI) methods to help identify which articles are worth reading and why. This option frees up time for deeper investigations and allows more names to be monitored.

Moody's Analytics Credit Sentiment Score™ solution uses state-of-the-art AI techniques such as natural language processing, text analytics, and machine learning to derive credit-relevant sentiment from news articles.

## WHAT IS A CREDIT SENTIMENT SCORE?

A credit sentiment score is a simple concept; it rates the negative credit sentiment of a news article. A high score indicates the presence of negative credit sentiment, while a low score means that none was found. The best way to understand credit sentiment scores is through a simple example ( Table 1)

TABLE 1: THREE EXAMPLE CREDIT SENTIMENT SCORES

| ARTICLE HEADLINE | CREDIT SENTIMENT SCORE |
| --- | ---: |
| Sears, US retail giant, files for bankruptcy | 100 |
| Sears announced that it added a new member to its board of directors who is familiar with bankruptcies and restructuring | 35 |
| Sears and Kmart merged to Sears Holdings in 2005 | 0 |

The Credit Sentiment Score solution can be used at origination, for portfolio risk monitoring, and adverse media tracking, delivering the following benefits:

» Identify credit-relevant news: If a credit sentiment score is high, then the article contains negative credit sentiment and deserves further investigation. High scores capture  negative news such as default, bankruptcy, covenant default, debt restructuring, rating downgrades, lawsuits, downsizing, and fraud events.

» Efficiency: Credit analysts can significantly reduce time spent on company research and monitoring activities. Our results show that the Credit Sentiment Score solution helps filter out between 75–99% of articles from an initial search.

» Early warning: Credit sentiment scores rise before major credit events. Our research indicates that scores are more than three times higher than normal and continue to rise starting nine months before such an event.

» Explainable: The Credit Sentiment Score solution assesses the negative credit sentiment of news stories. This news story can easily be read to understand its impact on the company in question.

» Rounded view: Using the Credit Sentiment Score solution alongside other quantitative metrics such as our Expected Default Frequency (EDF™) model gives context and identifies why changes in credit quality occur.

In this paper, we explain the Credit Sentiment Score solution and show how it works using a case study example.

## Information overload

News stories have always been used to help monitor companies' strengths by offering an extra point of view and a chance to understand a company and its credit quality. The news reflects the perception of the company—which can itself be a leading indicator of performance and credit quality. It plays an important role during monitoring by delivering information outside the reporting cycle.

However, monitoring news is costly. People are required to read, understand, and consider the relevance of an article. The number of accessible news sources has expanded since the advent of the internet. What used to take a few minutes skimming a newspaper's business pages now takes all morning downloading and digesting news from multiple online sources.

With reduced margins in the lending space the new normal, lenders must manage this cost to acceptable levels. Recent advances in applying AI techniques have enabled automation of many tasks—but bringing this technology to bear introduces new challenges, including:

» Finding, or creating, a well-labeled data source: Machine learning algorithms require a large training set on which to learn language patterns and groupings. The model must know which of the training set articles are examples of bad news. Creating such a training set takes time and resources.

» Investing in data science knowledge: Using the latest techniques to build machine learning models requires access to skills that are not traditionally found in a lender. These skills are often expensive and, if not carefully deployed, will reduce the desired cost savings.

» Understanding credit: Spotting credit-relevant stories is a different skill than simply noting the general sentiment of a company. Organizations must capture credit expertise to ensure the creation of a credit-relevant model.

We have found that technology-focused firms do not have the data or an understanding of the underlying problem to build a solution that works. Even lenders with the largest resources struggle to bring these elements together in a cost-effective way.

## Credit sentiment scores

Moody's Analytics Credit Sentiment Score solution is the culmination of many years of intensive research and investment.

We have been collecting and labeling news articles that describe company distress since the mid-1990s. We started an internal project to assist with the search and collection of news and used this existing data to train our models. We quickly became aware that many of our clients would find a solution based on the same technology useful during credit assessment and monitoring. This unique data source, combined with our analytical expertise and deep knowledge of credit, allowed us to develop innovative techniques.

Our solution helps lenders process news more quickly, freeing up time to do deeper investigations or monitor more names. Since the input is natural language text, our solution identifies articles that explain movements in quantitative risk measures.

The rest of this section explains the Credit Sentiment Score solution in more detail.

### HOW IT WORKS

Deriving a company-level credit sentiment score involves the following steps:

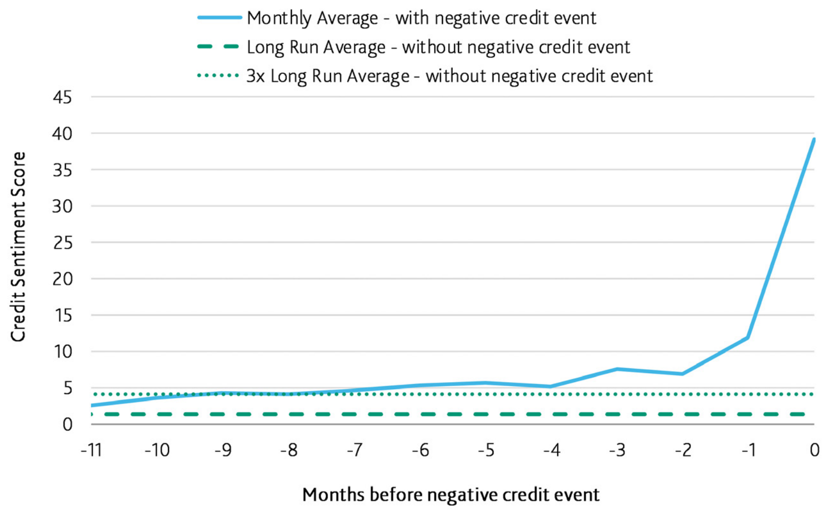
| | |
|---|---|
| Collect News Articles | » We pull news articles from a news aggregator based on a company name and a date range.<br>» During this search, we rely on the aggregator's entity recognition algorithms to find articles where a company is mentioned. |
| Filter News Articles | » Sometimes a company is mentioned in an article about another company. To help address this problem, we have a set of rules that filter down the number of articles further.<br>» For example, one rule counts the number of company mentions and where they appear in an article. A low number of mentions late in the article suggest that it is unlikely the article is about that company. |
| Score News Articles | » We run the article's text through our model to generate a score, measuring the presence of negative credit sentiment.<br>» We use a deep learning model framework overlaying an attention mechanism. We trained this model on our massive body of distressed company news. |
| Aggregate Article Scores | » We aggregate the article-level scores for each company to produce an index using a Bayesian Rating scheme. This aggregation builds on the intuition that more bad news is worse and that it lingers for a few weeks. |

### DOES IT WORK?

We completed a validation study to confirm that the model was picking up bad news before a credit event. More than half a million articles from 3,500 sources were collected and scored for 2,027 companies during the period from 2010–2018. Of these companies, 939 experienced a credit event in this time frame and the remaining became our control group.

Figure 1 shows the monthly average credit sentiment score of the companies in the run up to a credit event (blue line). For comparison, we also show the long-term average score for the control group (green dashed line) and three times this average (green dotted line). We see that the average credit sentiment score moves away from the long-term average as it moves toward a credit event. At around nine months before a credit event, the score is already around about three times this monthly average.

FIGURE 1: RESULTS OF VALIDATION STUDY



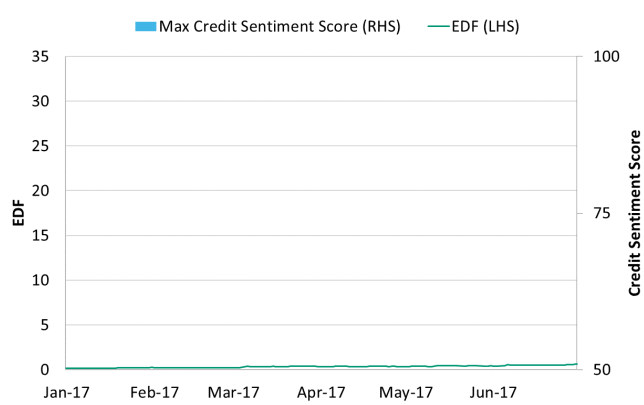

## Case study: Carillion

The easiest way to appreciate the benefits of credit sentiment scores is by looking at an example.

Carillion was a British multinational facilities management and construction services company that ran into financial trouble in early 2018. It became the largest-ever trading liquidation in the United Kingdom and generated a lot of news in the traditional media at the time.

Figure 2 shows the EDF[1] generated by our Moody's Analytics CreditEdge™ software. We see that the EDF is low—less than 0.5%—and although rising a little during the period, there is nothing of major concern. During the first half of 2017, there are several news articles about Carillion, but none of them exhibit negative credit sentiment.

FIGURE 2: CARILLION'S CREDIT SENTIMENT SCORE AND EDF: JANUARY-JUNE 2017




1 An EDF is a probability of default measure derived from daily equity market prices and company reported debt information found in annual reports and market disclosures. For more information, see https://www.moodysanalytics.com/product-list/creditedge.

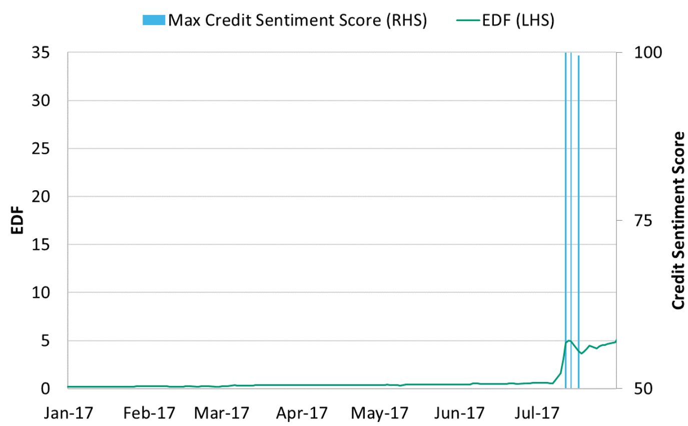
Move forward a month; and we see that the credit risk—as measured by EDF—has jumped to around 5% (Figure 3). We have also identified some bad news stories clustered around this event:

*"KPMG, which unearthed many of the problems with its contracts, has been retained to support the company in its negotiations with lenders."* [2]

Date: July 14, 2017
Credit Sentiment Score: 100

The Credit Sentiment Score solution keeps track of the deterioration of credit risk and calls out interesting articles. Only 5% of the articles are considered bad news (score > 50).

FIGURE 3: CARILLION'S CREDIT SENTIMENT SCORE AND EDF: JANUARY-JULY 2017

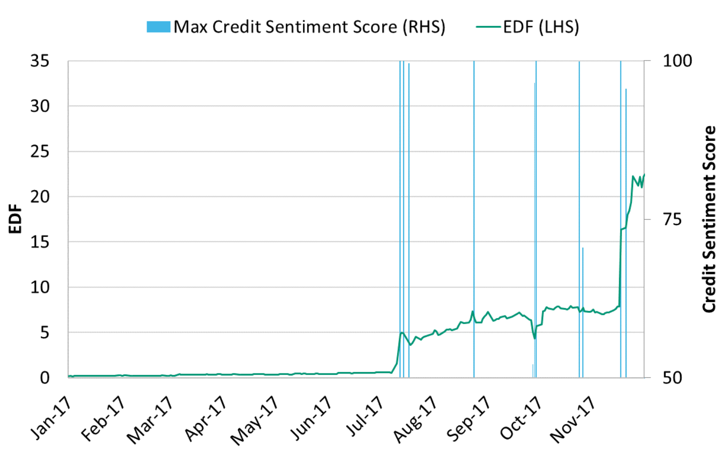



Moving through 2017, we see a continued run of bad news and another massive jump in credit risk in November (Figure 4). The Credit Sentiment Score solution highlights news stories which that quickly explain why:

*"Carillion warns on profits and says it will breach banking covenant."*[3]

Date: November 17, 2017
Credit Sentiment Score: 98

FIGURE 4: CARILLION'S CREDIT SENTIMENT SCORE AND EDF: JANUARY -NOVEMBER 2017



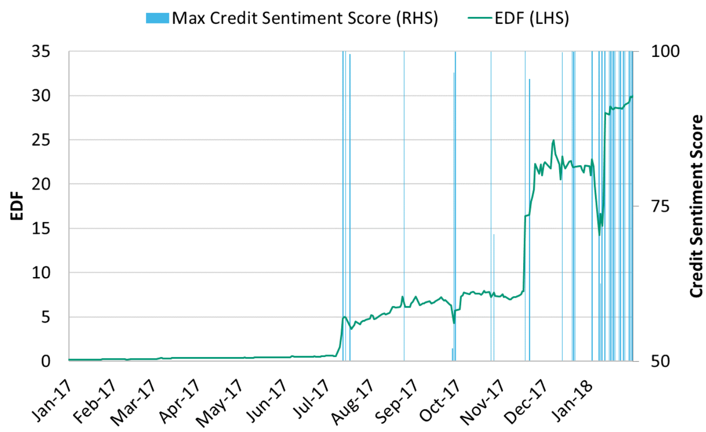

2 http://www.reuters.com/article/carillion-broker-idUSL8N1K50ZX
3 http://www.independent.co.uk/news/business/news/carillion-shares-plummet-profits-warning-covenants-breach-loan-restructure-construction-contracts-a8059851.html

Following the profit warning, the bad news keeps coming and eventually the company fails (Figure 5).

*"Construction giant Carillion goes into administration."* [4]

Date: January 15, 2018
Credit Sentiment Score: 100

FIGURE 5: CARILLION'S CREDIT SENTIMENT SCORE AND EDF: JANUARY 2017 – JANUARY 2018




## Conclusion

Our clients use credit sentiment scores to help them gain efficiencies in their early warning and monitoring processes. Where existing quantitative measures are available, the Credit Sentiment Score solution works in tandem, helping to explain sharp increases in risk measures. Where information is scarce, but news is available, Moody's Analytics Credit Sentiment Score solution delivers much-needed insight.

## CONTACT DETAILS

Visit us at **moodysanalytics.com** or contact us at a location below.

**AMERICAS**
+1.212.553.1653
clientservices@moodys.com

**EMEA**
+44.20.7772.5454
clientservices.emea@moodys.com

**ASIA (EXCLUDING JAPAN)**
+852.3551.3077
clientservices.asia@moodys.com

**JAPAN**
+81.3.5408.4100
clientservices.japan@moodys.com

BP61182