



Predictive Insights. Powered by AI.

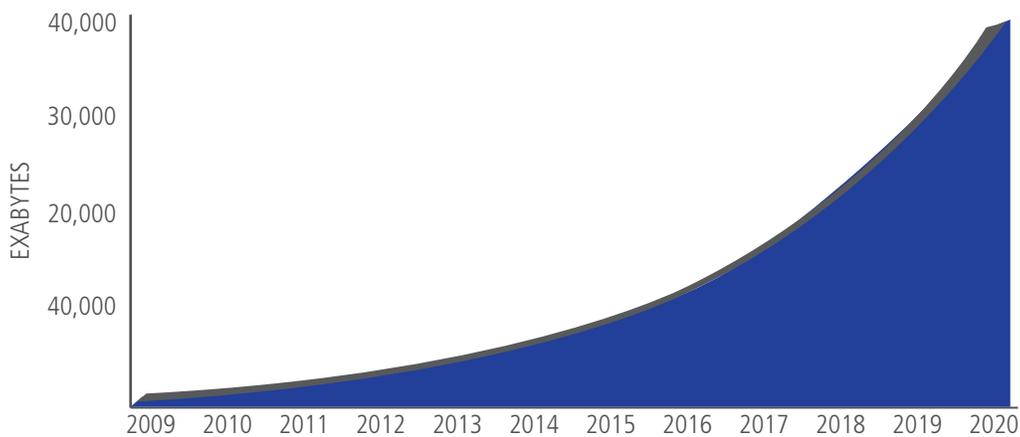
This report explains how the vast amount of content generated across online platforms (big data)¹ is transforming the investment management industry. Data-driven insights have evolved from the consumer products world to the financial world as money managers seek an informational edge to enhance their investment processes. The exponential growth of investment-related content across online platforms provides a vast dataset to analyze in order to extract actionable insights which can potentially identify stocks that will outperform.

Powerful Technologies Can Unlock Investment Insights from Big Data

BIG DATA, ARTIFICIAL INTELLIGENCE & NATURAL LANGUAGE PROCESSING

The internet has connected the world as never before, breaking down informational barriers and allowing us to share and collaborate in ways previously unimaginable. Big data has come to represent the collective information that is available from varying sources all over the world. Big data analysis can yield a wealth of knowledge that can be used to track, explain, and potentially predict, the big picture.

The Digital Universe: 50-fold Growth from the Beginning of 2009 to the End of 2020



Source: IDC's Digital Universe Study, sponsored by EMC, December 2012. 2016-2020 growth is estimated. There is no assurance that the projections will be met.

Processing and making sense of big data is beyond what any individual could analyze on their own. Advances in artificial intelligence (AI) techniques used in big data analysis allows for a deeper understanding of vast amounts of data, specifically data from the ever growing social media landscape. While AI may conjure thoughts of cyborgs and robots, at its core, AI is designed to help process data, make sense of it, and act on it.

Natural Language Processing (NLP) is the branch of computer science that deals with the interpretation, meaning, classification, and sentiment analysis of text. Advances in NLP techniques allow for more accurate sentiment analysis than ever before. Moving beyond traditional key word searches, Natural Language Processing today has evolved to provide individuals insights regarding the contextual meaning of datasets.

GROWTH OF ONLINE PLATFORMS

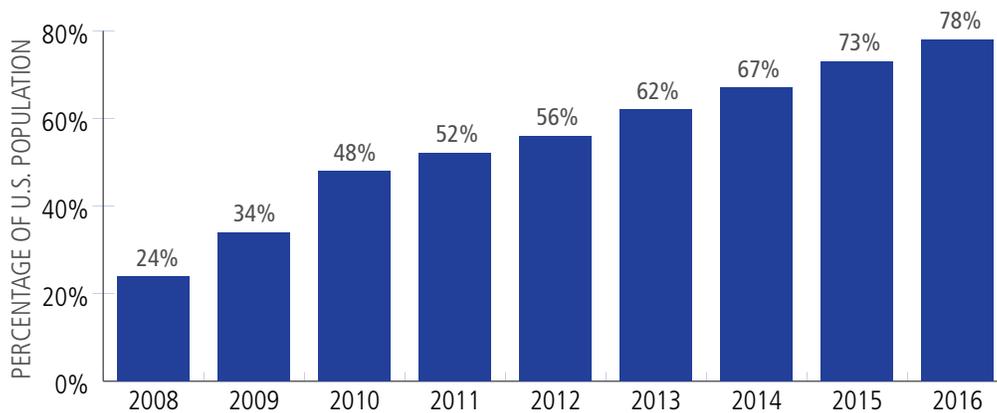
The emergence of online platforms has opened up numerous new forums for people to express their opinions and share experiences. In the U.S., 78% of the population has a social network profile. Headlines cross Twitter feeds faster than news networks. The proliferation of online interactions has created a vast set of data that can be analyzed to understand behaviors, trends and sentiments in order to identify actionable insights.

"Big data analysis can yield a wealth of knowledge that can be used to track, explain, and potentially predict, the big picture."

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"Natural Language Processing today has evolved to provide individuals insights regarding the contextual meaning of datasets."

Percentage of U.S. Population with a Social Network Profile from 2008 to 2016



Source: Edison Research; Triton Digital. As of January 31, 2016. 2016 data is an estimate.

“The proliferation of social media has created a vast set of data that can be analyzed to understand behaviors, trends and sentiments and ultimately help make better decisions.”

BIG DATA ANALYSIS FIRST DEPLOYED FOR BRAND AND CONSUMER ANALYTICS

Consumer product companies were the first to use predictive analysis mined from vast online datasets to help them identify marketing insights and manage their brands. Across various online platforms, including social media, individuals routinely express their opinions of a product, experiences within a store, and general encounters with various brands. Large technology companies such as salesforce.com and IBM offer numerous big data analytical tools for brand and sentiment monitoring in order to help the world’s leading brands capture insights from online and alternative datasets.



“Consumer product companies were the first to use predictive analysis mined from vast online datasets to help them identify marketing & brand insights.”

ADOPTION OF BIG DATA ANALYTICS AND ARTIFICIAL INTELLIGENCE APPLICATIONS WITHIN THE INVESTMENT COMMUNITY

The investment world – which has always been on the lookout for new ways to gain an informational advantage – has likewise recognized the value of big data. A growing number of asset managers are incorporating big data analytics within their investment processes.

Early attempts at stock sentiment analysis included offline (phone, paper) surveying, in-store questionnaires, and even door-to-door polling. However, it is well documented that people often say one thing when participating in a survey but then act in a different manner. Searching for deeper insights with respect to a company’s investment merits, hedge funds and other asset managers deployed specialty research firms to position canvassers at physical store locations, counting customers and conducting ad-hoc polls in an effort to understand sales patterns and product demand. Not only were these methods time-consuming and resource-intensive, they were also limited in the number of people they could reach.

“Today’s leading asset managers routinely incorporate big data analytics within their investment processes.”

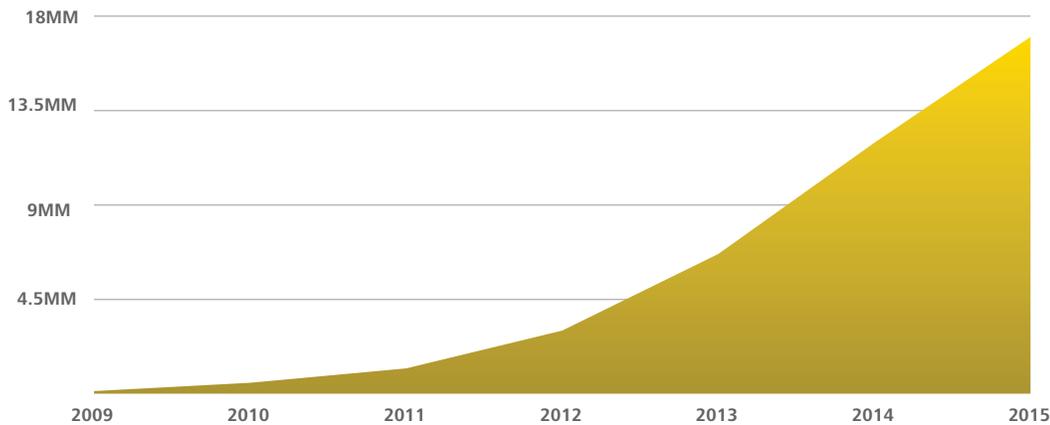
EMERGENCE OF INVESTMENT SPECIFIC ONLINE PLATFORMS - AN INDUSTRY GAME CHANGER



Today, millions of people voluntarily share their views not only about their own consumer behaviours and brand perception, but also their activities related to their investment ideas and portfolios. Over the past few years, user generated content has accelerated at an exponential rate. The result has been a proliferation in the breadth of discussion, depth of data and diversity of subject matter. Twitter’s adoption of the “Cashtag” methodology (\$+“TICKER”) in the summer of 2012 further enabled the growth of online content by providing a standardized structure to track stock specific discussions. Since then, Twitter has seen growth in finance discussion grow by >4X while dedicated investment community platforms have seen discussion growth exceeding those levels.

“With the introduction of cashtagging, discussions about individual stocks on social media has proliferated.”

StockTwits conversation volume now exceeds 1.5MM messages per month, covering more than 7000+ \$Tickers



Source: StockTwits. As of November 2015.

FINANCIAL APPLICATIONS OF INVESTMENT INSIGHTS FROM THE SOCIAL MEDIA LANDSCAPE

Large quantitative hedge funds were early adopters in integrating insights from alternative datasets into their investment processes. This investment approach was further validated when leading financial data providers such as Bloomberg and Thomson Reuters began offering sentiment insights based on online content to their subscribers. More recently, sentiment insights generated by artificial intelligence analytics models have been offered to retail investors of several large brokerage firms. TD Ameritrade and Fidelity now provide sentiment scoring metrics to their clients in addition to traditional fundamental research and technical indicators.

CAN SENTIMENT PREDICT STOCK PRICES?

Traditional asset pricing theory, fundamental analysis, relative value and other factor based approaches are typical methods deployed by investors in determining the investment merits of stocks. These methods are proven over a long time horizon; however, they often fail to explain short and medium-term stock price fluctuations. So, what influences asset price movements over these time periods? In our view, the answer is sentiment. Numerous studies have shown that investor sentiment plays an important role in financial markets. Investors have historically relied on rudimentary survey-based measures of sentiment for insights. Investor surveys such as the University of Michigan Consumer Sentiment Index and the AAll investor sentiment survey suffer from limitations associated with traditional survey-based approaches including negative bias potential, low incentive for truth-telling and reporting time-lags. Sentiment indicators derived from insights from online platforms have a distinct advantage relative to traditional survey-based approaches. User comments within the social media landscape are voluntarily generated and posted in real-time. The desire for collaboration and attaining social influence further self-regulates the discussion while fostering an environment with a high incentive for truth-telling.

In fact, there are numerous research studies published by academia relating to the potential power of sentiment insights derived from data from various online platforms. These academic research reports find compelling evidence linking investor sentiment data derived from online sources including social media, news articles and blog posts in predicting future stock performance. Notably, In the report titled *"Identification of a Social Media Equity Factor Derived Directly from Tweet Sentiments"*, professors Jim Liew and Tamas Budavari found *"significant evidence that the characteristics of securities derived from social media information sources have significant power in explaining the time-series of daily returns"*, while Patrick Houlihan and Germán Creamer found a similar relationship in their research report titled *"Leveraging Social Media to Predict Continuation and Reversal in Asset Prices"*. Their research showed *"that message volume and sentiment from StockTwit messages contained information about future price changes."*

"The growing adoption of social media analytics by the investment community validates the value of big data."

"Sentiment indicators derived from insights from online platforms have a distinct advantage relative to traditional survey-based approaches."

"Numerous academic studies find compelling evidence linking investor sentiment data derived from the social media landscape in predicting future stock performance."

Summary

EXPONENTIAL GROWTH OF BIG DATA ACROSS ONLINE PLATFORMS

The exponential growth of discussions about individual stocks from online sources including social media platforms, news articles and blog posts provides a rich new dataset.

THE POTENTIAL TO GAIN AN INFORMATIONAL EDGE

Advances in AI and NLP technologies enable investors to harness this vast dataset to identify actionable investment insights about individual stocks, a task that a few years ago would have been impossible.

GROWING EVIDENCE THAT INVESTOR SENTIMENT CAN BE PREDICTIVE OF STOCK RETURNS

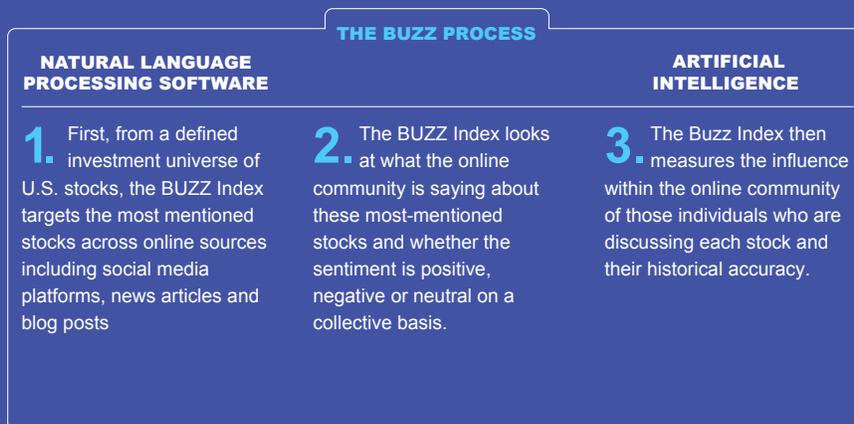
There is a growing body of academic research that links investor sentiment with future stock performance. See Appendix for a sample of related studies.

The BUZZ NextGen AI US Sentiment Leaders Index (“BUZZ Index”) employs leading edge analytics to harness the investment insights derived from vast datasets generated across online platforms.

The BUZZ Index identifies 75 U.S. stocks with the most positive investment insights and sentiment measures.



The data is filtered through an analytics model which utilizes Natural Language Processing Algorithms and Artificial Intelligence applications.

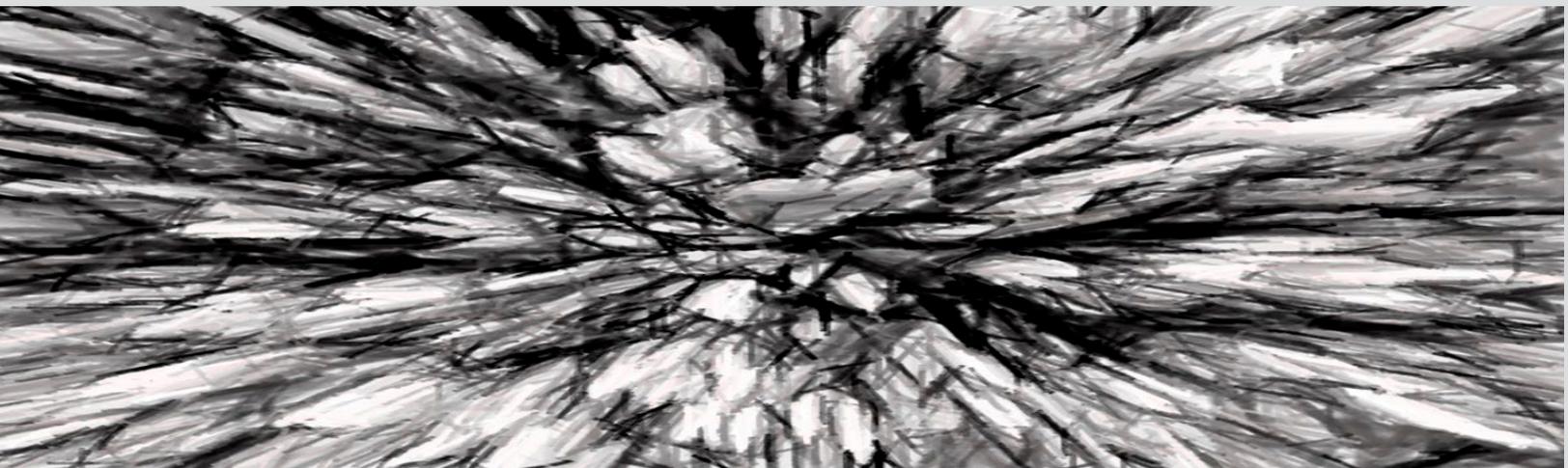


BUZZ NEXTGEN AI US SENTIMENT LEADERS INDEX

Appendix

The following is a sample of available research within the field:

1. *"Twitter mood predicts the stock market"* – Bollen, Mao, and Zeng (2011).
2. *"Predicting Stock Market Indicators Through Twitter"* – Zhang, Fuehres and Gloor (2011).
3. *"Twitter and Stock Returns"* – Forbergskog and Blom (2013).
4. *"Generating Abnormal Returns Using Crowdsourced Earnings Forecasts from Estimote"* – Drogen and Jha (2013).
5. *"Web Sentiment Analysis for Revealing Public Opinions, Trends and Making Good Financial Decisions"* – Bissattini and Christodoulou (2013).
6. *"Trading on Twitter: The Financial Information Content of Emotion in Social Media"* – Sul, Dennis, and Yuan (2014).
7. *"Wisdom of Crowds: The Value of Stock Opinions Transmitted Through Social Media"* – Chen, De, Yu, and Hwang (2014).
8. *"The Value of Crowdsourcing: Evidence from Earnings Forecasts"* – Bliss and Nikolic (2015).
9. *"The Value of Crowdsourced Earnings Forecasts"* – Jame, Johnston, Markov, and Wolfe (2015).
10. *"Twitter Sentiment and IPO Performance: A Cross-Sectional Examination"* – Liew and Wang (2015).
11. *"Leveraging Social Media to Predict Continuation and Reversal in Asset Prices"* – Houlihan and Creamer (2015).
12. *"Identification of a Social Media Equity Factor Derived Directly from Tweet Sentiments"* – Liew and Budavari (2015).
13. *"Stock Return Predictability and Investor Sentiment: A High-Frequency Perspective"* – Sun, Najand and Shen (2015).
14. *"Structure in the Tweet Haystack: Uncovering the Link between Text-Based Sentiment Signals and Financial Markets"* – Klusmann, Ebner & Konig (2015).
15. *"Improving Prediction of Stock Market Indices by Analyzing the Psychological States of Twitter Users"* – Porshnev, Redkin and Shevchenko (2015).
16. *"Do Tweet Sentiments Still Predict the Stock Market?"* – Kyung-Soo Liew and Budavari (2016).
17. *"Can Sentiment Indicators Signal Market Reversals?"* – Lagarde (2016).
18. *"Tweet Sentiments and Stock Market: New Evidence from China"* – Xu, Liu, Zhao and Su (2017).



BUZZ NEXTGEN AI SERIES INDICES: US SENTIMENT LEADERS INDEX

A Primer for Investors

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