NRI

Iakyara vol.270

Can AI improve portfolio managers' Investment decision-making?

Yusuke Umezu

13.October.2017

Nomura Research Institute, Ltd.

Executive Summary

Nomura Research Institute and Nomura Asset Management recently conducted a proof of concept using natural language analysis, a form of AI, in the asset management industry. If properly customized, AI can quantitatively support portfolio managers' analysis of qualitative information.

Yusuke Umezu
Senior System Consultant
Asset Management
Systems Department Ⅱ

Artificial intelligence (AI) is booming for the third time in its history. With cloud computing and Big Data analytics now largely ubiquitous, AI applications such as natural language processing, voice recognition and image recognition are driving utilization of previously unwieldy data.

Even in the financial sector, AI is starting to be put to various uses under the rubric of FinTech. Its uses span a broad range of technologies and applications both old (e.g., automated quantitative analysis) and new (e.g., natural language processing). At Nomura Research Institute (NRI), we recently teamed up with Nomura Asset Management to do a PoC (proof of concept) of a natural language processing system intended to help portfolio managers make stock trading decisions.

Use of AI for text analysis by portfolio managers

In making investment decisions, portfolio managers regularly analyze not only analyst reports and proprietary research but also information from a variety of online sources ranging from news sites to social media. They synthesize such diverse information to gauge unfolding events' implications for companies' earnings outlook and share prices.

The subject of our PoC was a system that uses AI to analyze information that portfolio managers monitor daily and evaluate its company-specific implications. More specifically, it uses natural language processing[1] powered by deep learning[2] to analyze texts and score their content on a positivity/negativity scale intended to quantify the likelihood of the texts' information positively or negatively affecting the earnings and/or valuation(s) of the company or companies to which it pertains. Our PoC tested whether these positivity/negativity scores improved the accuracy and/or efficiency of portfolio managers' investment decision-making.

NOTE

1) Natural language processing is computerized analysis of human language used in everyday contexts. One step in our PoC's methodology was morphological analysis, which involved segmenting the subject documents' text into the smallest feasible subunits (e.g., individual words) and annotating the text with information on words' grammatical functions. Other steps included expressing a text's composition and its constituent words' meaning as an n-dimension vector (vectorization) and comparing the text's similarity to training data based on cosine similarity.

2) Machine learning technology uses statistical algorithms derived from voluminous data to performs tasks such as forecasting unknown aspects of the data or categorizing existing data. Deep learning is a form of machine learning that utilizes algorithms modeled after human neural networks.

©2017 Nomura Research Institute, Ltd. All Rights Reserved.

For analyzing the texts' information, we used four means to align the AI-derived scores with portfolio managers' thought processes (see diagram). First, we selected training data[3]. Analyst reports tend to be largely standardized in terms of content. They often convey positive or negative judgments in the form of changes in investment ratings. We used analyst reports that communicated rating changes as training data to improve our scoring algorithm's accuracy.

3) Training data are fed into an AI algorithm during its learning phase to teach the algorithm to make accurate assessments.

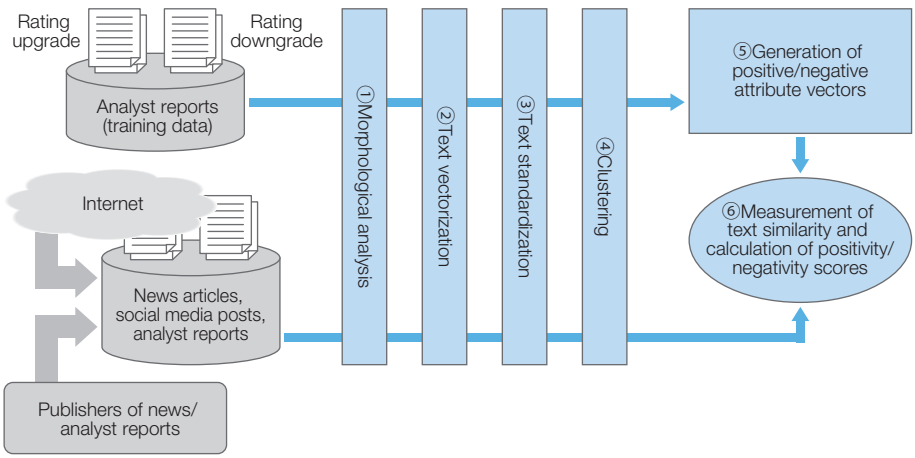
Second, we standardized the inputted texts by filtering out stylistic features specific to, say, a certain investment bank or news site. Such standardization enables documents published by different sources to be compared uniformly.

Third, we incorporated clustering[4] into our scoring algorithm. Information often may have positive implications for certain companies and negative implications for others. Yen appreciation, for example, is negative for exporters but positive for importers. To derive positivity/negativity scores consistent with the nature of the subject companies' respective businesses, we used AI to categorize companies. This categorization, which turned out to be virtually identical to a conventional sector classification, enabled more accurate scoring.

4) Clustering is a process whereby an AI algorithm identifies commonalities through machine learning and classifies data based on those commonalities.

Fourth, we took into account the training data's original publication date in recognition that both the market environment and the Japanese language's usage (e.g., words' nuances) change over time. We weighted the training data by publication date (recency), enabling even-handed comparison across documents from different timeframes.

AI-enabled text analytics system



Source: NRI

©2017 Nomura Research Institute, Ltd. All Rights Reserved.

AI has potential to quantitatively support qualitative analysis

When we tested our algorithm's scoring of actual analyst reports using the methods described above, the scores were consistent with the reports' changes in investment ratings about 80% of the time. Even when tested on nonstandard text samples like online news articles and social media content, our scoring algorithm generally concurred with portfolio managers' assessments of the same information.

Additionally, we found that our algorithm could detect signs of impending investment-rating changes in analyst reports that contained a mixture of positive and negative information but left the existing investment rating unchanged. We also found that the positivity/negativity scores' absolute value could be used as a gauge of the scores' "conviction". Stocks that were the subject of information with a high score in absolute value terms (i.e., either highly positive or highly negative) tended to subsequently outperform (if positive) or underperform (if negative) stocks that were the subject of information with same-signed scores of lower absolute value. These findings suggest that AI-enabled quantitative analysis can help portfolio managers assess qualitative information that they would ordinarily evaluate heuristically based on experience.

Importance of AI-enabled analysis of qualitative information

Our PoC affirmed that natural language analysis can effectively support investment decision-making. However, its assessments are not completely reliable as an accuracy remained around 80%. A number of deficiencies still need to be resolved, including reduced accuracy when the subject text is shorter in length or more colloquial in tone. Nonetheless, AI's ability to analyze not only quantitative but also qualitative data like natural language should greatly expand AI's scope of application as "intelligence," not merely computational brute force. If technological advancement leads to improvement in analytical accuracy, AI may someday enable portfolio managers to identify investment opportunities they otherwise would have missed. We must continue researching and testing AI in pursuit of better investment processes.

©2017 Nomura Research Institute, Ltd. All Rights Reserved.

about NRI

Founded in 1965, Nomura Research Institute (NRI) is a leading global provider of system solutions and consulting services with annual sales above $3.7 billion. NRI offers clients holistic support of all aspects of operations from back- to front-office, with NRI's research expertise and innovative solutions as well as understanding of operational challenges faced by financial services firms. The clients include broker-dealers, asset managers, banks and insurance providers. NRI has its offices globally including New York, London, Tokyo, Hong Kong and Singapore, and over 12,000 employees.

For more information, visit http://www.nri.com/global/

The entire content of this report is subject to copyright with all rights reserved.
The report is provided solely for informational purposes for our UK and USA readers and is not to be construed as providing advice, recommendations, endorsements, representations or warranties of any kind whatsoever.
Whilst every effort has been taken to ensure the accuracy of the information, NRI shall have no liability for any loss or damage arising directly or indirectly from the use of the information contained in this report.
Reproduction in whole or in part use for any public purpose is permitted only with the prior written approval of Nomura Research Institute, Ltd.

Inquiries to : Business Planning & Financial IT Marketing Department
Nomura Research Institute, Ltd.
Otemachi Financial City Grand Cube,
1-9-2 Otemachi, Chiyoda-ku, Tokyo 100-0004, Japan
E-mail : kyara@nri.co.jp

http://www.nri.com/global/opinion/lakyara/index

©2017 Nomura Research Institute, Ltd. All Rights Reserved.