

Long short-term memory networks for CSI300 volatility prediction with Baidu search volume

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Summary

Intense volatility in financial markets affects humans worldwide. Therefore, relatively accurate prediction of volatility is critical. We suggest that massive data sources resulting from human interaction with the Internet may offer a new perspective on the behavior of market participants in periods of large market movements. First, we select 28 key words, which are related to finance as indicators of the public mood and macroeconomic factors. Then, those 28 words of the daily search volume based on Baidu index are collected manually, from June 1, 2006 to October 29, 2017. We apply a Long Short-Term Memory neural network to forecast CSI300 volatility using those search volume data. Compared to the benchmark GARCH model, our forecast is more accurate, which demonstrates the effectiveness of the LSTM neural network in volatility forecasting.

REFERENCES

- 1 Simon HA. A behavioral model of rational choice. *Q J Econ.* 1955; 69(1): 99–118.

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4 King G. Ensuring the data-rich future of the social sciences. *Science*. 2011; 331(6018): 719-721.

[CAS](#) | [PubMed](#) | [Web of Science®](#) | [Google Scholar](#)

5 Lazer D, Pentland A, Adamic L, Aral S, et al. Life in the network: the coming age of computational social science. *Science*. 2009; 323(5915): 721-723.

[CAS](#) | [PubMed](#) | [Web of Science®](#) | [Google Scholar](#)

6 Moritz B, Zimmermann T. Tree-based conditional portfolio sorts: the relation between past and future stock returns. Social Science Electronic Publishing; 2016.

[Google Scholar](#)

7 Yu Q, Zhang B. Investors' limited concentration and equity return—an empirical study using Baidu index as indicator for concentration. *J Financial Res*. 2012; 8: 152-165.

[Google Scholar](#)

8 Zhao L, Lu Z, Wang Z. Equity selection in Baidu—an empirical study on the relation between equity return and Baidu search volume. *J Financial Res*. 2013; 4: 183-195.

[Google Scholar](#)

9 Zhi DA, Engelberg J, Gao P. In search of attention. *J Finance*. 2011; 66(5): 1461-1499.

[Web of Science®](#) | [Google Scholar](#)

10 Preis T, Moat HS, Stanley HE. Quantifying trading behavior in financial markets using google trends. *Sci Rep*. 2013; 3.

[Web of Science®](#) | [Google Scholar](#)

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13 Petersen AM, Tenenbaum JN, Havlin S, Stanley HE, Perc M. Languages cool as they expand: allometric scaling and the decreasing need for new words. *Sci Rep.* 2012; 2.

[Web of Science®](#) | [Google Scholar](#) |

14 Garman MB, Klass MJ. On the estimation of security price volatilities from historical data. *J Bus.* 1980; 53(1): 67

[Web of Science®](#) | [Google Scholar](#) |

15 Fischer T, Krauss C. Deep learning with long short-term memory networks for financial market predictions. *Eur J Oper Res*; 2017. In press.

[PubMed](#) | [Web of Science®](#) | [Google Scholar](#) |

16 Fama EF. Efficient capital markets: a review of theory and empirical work. *J Finance.* 1970; 25(2): 383-417.

[Web of Science®](#) | [Google Scholar](#) |

17 Hochreiter S, Schmidhuber J. Long short-term memory. *Neural Comput.* 1997; 9(8): 1735-1780.

[CAS](#) | [PubMed](#) | [Web of Science®](#) | [Google Scholar](#) |

18 Gers FA, Schmidhuber J, Cummins F. Learning to forget: continual prediction with LSTM. *Neural Comput.* 2000; 12(10): 2451-2471.

[CAS](#) | [PubMed](#) | [Web of Science®](#) | [Google Scholar](#) |

19 Graves A, Schmidhuber J. Framewise phoneme classification with bidirectional LSTM and other neural network architectures. *Neural Netw.* 2005; 18(5-6): 602-610.

[PubMed](#) | [Web of Science®](#) | [Google Scholar](#) |

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