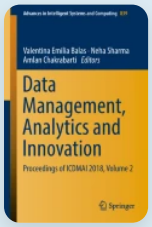
# Big Data Analytics: A Trading Strategy of NSE Stocks Using Bollinger Bands Analysis

Conference paper | First Online: 08 September 2018

pp 143–154 | Cite this conference paper




**Data Management, Analytics and Innovation**

Gokul Parambalath, E. Mahesh, P. Balasubramanian & P. N. Kumar

**Part of the book series:** Advances in Intelligent Systems and Computing ((AISC,volume 839))



## Abstract

The availability of huge distributed computing power using frameworks like Hadoop and Spark has facilitated algorithmic trading employing technical analysis of Big Data. We used the conventional Bollinger Bands set at two standard deviations based on a band of moving average over 20 minute-by-minute price values. The Nifty 50, a portfolio of blue chip companies, is a stock index of National Stock Exchange (NSE) of India reflecting the overall market sentiment. In this work, we analyze the intraday trading strategy employing the concept of Bollinger Bands to identify stocks that generates maximum profit. We have also

examined the profits generated over one trading year. The tick-by-tick stock market data has been sourced from the NSE and was purchased by Amrita School of Business. The tick-by-tick data being typically Big Data was converted to a minute data on a distributed Spark platform prior to the analysis.

## References


1. Kabasinskas, A., & Macys, U. (2010). Calibration of Bollinger Bands parameters for trading strategy development in the Baltic stock market. *Inzinerine Ekonomika-Engineering Economics, 21*(3), 244–254.

   Google Scholar

2. Shleifer, A. (2000). *Inefficient markets: An introduction to behavioral finance*. Oxford University Press.

   Google Scholar

3. Bollinger, J. (1992).“Using Bollinger”, Bands. *Stocks & Commodities, 10/2*, 47–51.

   Google Scholar

4. Bollinger, J. (2001). *Bollinger on Bollinger Bands*. New York: McGraw-Hill.

   Google Scholar

5. Fama, E. (1965). The behavior of stock market prices. *Journal of Business, 38,* 34–105.

   Article Google Scholar

6. Fama, E., & Miller, M. H. (1972). *The theory of finance*. New York: Holt, Rinehart and Winston.

   Google Scholar

7. Baltussen, G. (2009). *Behavioral finance: An introduction*. http://ssrn.com/abstract=1488110.

8. Mandelbrot, B. B. (1963). The variation of certain speculative prices. *Journal of Business, 36,* 394–419.

Article Google Scholar

9. Mandelbrot, B. B. (1963). New methods in statistical economics. *Journal of Political Economy, 71,* 421–440.

Article Google Scholar

10. Mandelbrot, B. B. (1964). The variation of certain speculative prices. In P. Cootner (Ed.), *The random character of stock prices*. Cambridge: MIT Press.

Google Scholar

11. Nair, B. B., & Mohandas, V.P. (2015). Artificial intelligence applications in financial forecasting—a survey and some empirical results. *Intelligent Decision Technologies, 9*, 99–140. https://doi.org/10.3233/idt-140211 (IOS Press).

12. Nair, B. B., & Mohandas, V. P. (2015). An intelligent recommender system for stock trading. *Intelligent Decision Technologies, 9*, 211–220. https://doi.org/10.3233/idt-140220 (IOS Press).

13. Kumar, P. N., Rahul Seshadri, G., Hariharan, A., Mohandas, V. P., & Balasubramanian, P. (2011). Financial market prediction using feed forward neural network. In *International Conference on Technology Systems and Management*. Communications in Computer and Information Science, CCIS (Vol. 145, pp. 77–84).

Google Scholar

14. Lai, H. C., Tseng, T. C., & Huang, S. C. (2016). Combining value averaging and Bollinger Band for an ETF trading strategy. *Applied Economics, 48*(37), 3550–3557.

Google Scholar

15. Lento, C., Gradojevic,* N., & Wright, C. S. (2007). Investment information content in Bollinger Bands. *Applied Financial Economics Letters, 3*, 263–267.

Google Scholar

16. Leung, J. M. J, & Chong, T. T. L. (2003). An empirical comparison of moving average envelopes and Bollinger Bands. *Applied Economics Letters, 10*, 339–341.

Google Scholar

17. Harris, L. (2003). *Trading and exchanges: Market microstructure for practitioners*. Oxford University Press.

Google Scholar

## Acknowledgements

The authors would like to thank Amrita School of Business for providing the tick-by-tick trade data and the Centre of Excellence in Computational Engineering & Networking (CEN), Amrita University for support of Spark platform to handle the Big Data of stock prices.

## Author information

### Authors and Affiliations

**Department of Economics, Christ University, Bengaluru, India**

Gokul Parambalath & E. Mahesh

**Amrita School of Business, Amrita University, Coimbatore, India**
P. Balasubramanian

**Department of Computer Science and Engineering, Amrita University, Coimbatore, India**
P. N. Kumar

## Corresponding author

Correspondence to P. N. Kumar .

# Editor information

## Editors and Affiliations

**Department of Automatics and Applied Software, Aurel Vlaicu University of Arad, Arad, Romania**
Valentina Emilia Balas

**Adyogik Tantra Shikshan Sanstha's IICMR, Pune, Maharashtra, India**
Neha Sharma

**Faculty of Engineering and Technology, A.K. Choudhury School of Information Technology, Kolkata, India**
Amlan Chakrabarti

# Appendix

## 1.1 R Program Implementation of Trading Strategy Employing Bollinger Bands

### 1.1.1 Intraday Profits

The R program for calculating the intraday profits generated using the Bollinger Band algorithm and volatility are given below:

*main_intraday.R*

*setwd("C:\\Users\\Desktop\\bb\\yearfullsorted")*

*stock_list<-dir();*

*for(i in 1:49)*

*{rm(stock);*

*work<-stock_list[i]*

*setwd("C:\\Users\\Desktop\\bb\\yearfullsorted");*

*stock1<-read.csv(work)*

*stock<-stock1[1:350,];*

*names(stock)[1]<-"stock";*

*names(stock)[2]<-"date";names(stock)[3]<-"time"*

*names(stock)[4]<-"price";*

*names(stock)[5]<-"qty";*

*setwd("C:\\Users\\Desktop\\bb\\work")*

*source("bollinger.R");*

*setwd("C:\\Users\\Desktop\\bb\\yearfullsorted")*

*}*

### 1.1.2 5.4.2 One-Year Profits

The R program for calculating the 1-year profits generated using the Bollinger Band algorithm and the volatility calculated are given below:

*main - full - year.R*

*setwd("C:\\Users\\Desktop\\bb\\yearfullsorted")*

*stock_list<-dir();*

```
for(i in 1:49)

{

rm(stock)

work<-stock_list[i];

setwd("C:\\Users\\Desktop\\bb\\yearfullsorted")

stock<-read.csv(work);names(stock)[1]<-"stock";

names(stock)[2]<-"date";names(stock)[3]<-"time";

names(stock)[4]<-"price";names(stock)[5]<-"qty";
setwd("C:\\Users\\Desktop\\bb\\work")

source("bollinger.R");

setwd("C:\\Users\\Desktop\\bb\\yearfullsorted")

}
```

bollinger.R

```
library("TTR");

stock[6]=round(SMA(stock[4],n=20,na.rm=TRUE),digits=2)

names(stock)[6]<-"SMA";k=19;p=nrow(stock)-k;

for (i in 1:p)

{r=k+i;

stock[r,7]=round(sd(stock$SMA[i:r]),digits=2)};

names(stock)[7]<-"SD"

stock[,8]=round((stock[,6]+2*stock[,7]), digits=2);

stock[,9]=round((stock[,6]-2*stock[,7]), digits=2);

names(stock)[8]<-"UB";names(stock)[9]<-"LB"

volatility<- round(mean(stock$SD,na.rm="true")*4, digits=2)
```

```
avg_qty<-round(mean(stock$qty, digits=2));

tot_rows=nrow(stock);qty_bought<-0; qq<-0;

sold_amt<-0.0; buy_amt=0.0;sold<-0.0;

invest_fund=100000; for(i in 40:tot_rows)

{if ((stock$price[i]<stock$LB[i]) && (stock$qty[i] > (avg_qty)))

{qty_bought=qty_bought + round((invest_fund/stock$price[i]),digits=0);

bb<-round(invest_fund/stock$price[i], digits=0);

qq<- qq+bb; buy_amt<-buy_amt+invest_fund;}

if ((stock$price[i]>stock$UB[i])&& (stock$qty[i] >avg_qty))

{sold<-(stock$price[i]*qty_bought);sold_amt<-sold_amt+sold;

qty_bought=0;}}

invest_amt_bal=(qty_bought*max(stock$price))

tot_sale=sold_amt+invest_amt_bal; intraday_profit=tot_sale-buy_amt;

profit<-round(intraday_profit/buy_amt*100, digits=2);

result<-c(qq,tot_sale,buy_amt,intraday_profit,profit,volatility)

print(result);
```

## Rights and permissions



## Copyright information



## About this paper

## Cite this paper

Parambalath, G., Mahesh, E., Balasubramanian, P., Kumar, P.N. (2019). Big Data Analytics: A Trading Strategy of NSE Stocks Using Bollinger Bands Analysis. In: Balas, V., Sharma, N., Chakrabarti, A. (eds) Data Management, Analytics and Innovation. Advances in Intelligent Systems and Computing, vol 839. Springer, Singapore. https://doi.org/10.1007/978-981-13-1274-8_11

.RIS .ENW .BIB

DOI
https://doi.org/10.1007/978-981-13-1274-8_11

Published
08 September 2018

Publisher Name
Springer, Singapore

Print ISBN
978-981-13-1273-1

Online ISBN
978-981-13-1274-8

eBook Packages
Engineering
Engineering (R0)

## Publish with us

Policies and ethics

## Search

**Search by keyword or author**

## Navigation

**Find a journal**

**Publish with us**

## Track your research