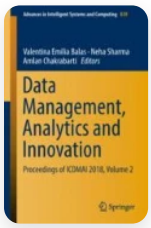
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Big Data Analytics: A Trading Strategy of NSE Stocks Using Bollinger Bands Analysis

| 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))

1885 Accesses **16** Citations

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.

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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.

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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);
```

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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 Published Publisher Name

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

08 September 2018

Springer, Singapore

Print ISBN
978-981-13-1273-1

Online ISBN
978-981-13-1274-8

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