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

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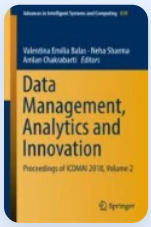

Data Management, Analytics and Innovation

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

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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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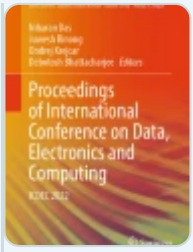

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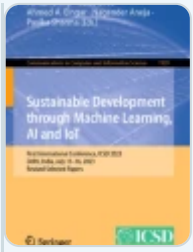

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Author information

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

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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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