B4 – Computer Numerical Analysis – Trade

Bollinger Bands

stairway to trading event

Bollinger Bands

binary name: bollinger
group size: 1
repository name: bollinger_$ACADEMIC_YEAR
repository rights: ramassage-tek
language: C, C++, perl 5, python 3 ($\geq$ 3.5), ruby 2 ($\geq$ 2.2), php 5.6 or bash 4
compilation: when necessary, via Makefile, including re, clean and fclean rules

- Your repository must contain the totality of your source files, but no useless files (binary, temp files, obj files,...).

- Error messages have to be written on the error output, and the program should then exit with the 84 error code (0 if there is no error).

> **trade**: the act of buying, selling, or exchanging stocks, bonds, or currency.
>
> *dictionnary.com*

The term `trading` simply means "exchanging one item for another", that is to say the exchange of goods for money (or in other words: buying something...).
When we talk about trading in the financial markets, it is pretty much the same, except that shares are traded. It is all virtual.

As you can imagine, trading bots can be very effective and very profitable!
Thus developing trading algorithms is a very competitive and open challenge.

Bollinger Bands are a highly popular technical analysis technique.
Many traders believe the closer the prices move to the upper band, the more overbought the market, and the closer the prices move to the lower band, the more oversold the market.

You have to write this algorithm, in order to later develop your own tools to help you to trade like a pro.

> It's a research project, Internet will help a lot!
> Check these keywords: moving average, stock exchange candles, standard deviation, period, forex, middle/upper/lower band.

To do so, your binary will receive several arguments:

1. the **period**, which is the number of previous indexes to compute the moving average,
2. a **standard deviation coefficient**; in professional trading, it is closely related to period,
3. a **file containing all the indexes**, each line of which represents a daily index (the most recent index being at the end of the file),
4. the **index number** for which we want to get the moving average and the upper and lower bands.

Use forex (currency exchange), crypto-currency, raw materials and stock exchange indexes to have different examples from real life.

Be sure to fully understand what a standard deviation coefficient is, it's really important!

In case of non usable lines in the file, such as non numerical values or bad formatting, just skip them.

Rigor and mathematical rigor are very important.
Check them VERY carefully and remember to return 84!

```
~/B-CNA-410> ./bollinger -h
Bollinger Bands

USAGE
    ./bollinger [-h] period standard_dev indexes_file index_number

    period          number of indexes for the moving average
    standard_dev    standard deviation coefficient to apply
    indexes_file    file containing daily indexes
    index_number    index number to compute moving average and Bollinger bands

OPTIONS
    -h              print the usage and quit.
```

All Bollinger-Bands-related functions/libraries are forbidden.
All functions from math libraries are also forbidden, except power and square root.

Example

Here is an example file, and some corresponding expected outputs.

```
~/B-CNA-410> cat -e bollinger_bitcoin_dec2017.txt
15046.269531$
13503.349609$
12697.709961$
12669.290039$
13863.959961$
14196.480469$
13651.179688$
13832.480469$
14879.759766$
16376.299805$
15992.809570$
15992.440430$
14992.290039$
13961.360352$
13009.240234$
11867.059570$
12503.759766$
11887.309570$
11733.820313$
13259.280273$
13087.450195$
12264.019531$
12247.679688$
10654.400391$
11850.309570$
11391.389648$
12319.790039$
12786.040039$
12725.410156$
14183.299805$
14338.580078$
13721.269531$
```

```
▽                              Terminal                        -  +  X
~/B-CNA-410> ./bollinger 20 2 bollinger_bitcoin_dec2017.txt 25
INPUT
Index: 25
Period: 20
SD_coef: 2.00

OUTPUT
MA: 13271.72
SD: 1617.77
B+: 16507.25
B-: 10036.18
```

```
▽                              Terminal                        -  +  X
~/B-CNA-410> ./bollinger 10 1.5 bollinger_bitcoin_dec2017.txt 15
INPUT
Index: 15
Period: 10
SD_coef: 1.50

OUTPUT
MA: 14455.49
SD: 1376.74
B+: 16520.60
B-: 12390.39
```

Bonus

You could implement a lot of extra features that you may find relevant for the Trading project :

- a graphical interface,
- a Bollinger Bands interpretation engine that would recommend to buy, sell or wait,
- self-adjustement of period or standard deviation, depending on the tendency,
- other trading algorithms.

> We advice you to develop a graphical interface as soon as possible.
> It could be really helpful for the rest of the unit…

{ EPITECH. }