Parleyland trading centre
Functions required for graphs

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1 Basics

- Straight lines of different directions and slopes
- Ruler for measurement
- Scaling and time-shifting

2 Set up

Let $\{x_t\}_{t=1}^{T}$ be the original series. In the competition if we receive one observation per second, then by the end of the first minute we will have $T = 60$, which is quite decent for plotting. Notice that however, if we wish to scale, e.g. group 4 seconds into one bar, then by the end of the first minute we will only have $T = 15$.

Let N be the desired lags for computation. Here we shall set $N = 20$, but we should leave availability for adjustments.

3 Bollinger Bands

Three lines in total: LBL, MA, and UBL.

3.1 Computation of MA

$$\hat{\mu}_t = N^{-1}\left(\sum_{j=t-N+1}^{t} x_j\right) \ \forall t \geq N \tag{1}$$

MA is the line that plots series $\{\hat{\mu}_t\}_{t=N}^{T}$

3.2 Computation of standard deviation

$$\hat{\sigma}_t = \sqrt{N^{-1}\sum_{j=t-N+1}^{t}(x_j - \hat{\mu_j})^2} \ \forall t \geq 2N-1 \tag{2}$$

3.3 Computation of UBL & LBL

$\forall t \geq 2N-1$,

$$U_t = \hat{\mu}_t + 1.96\hat{\sigma}_t \tag{3}$$
$$L_t = \hat{\mu}_t - 1.96\hat{\sigma}_t \tag{4}$$

UBL is the line that plots series $\{U_t\}_{t=2N-1}^{T}$ and LBL is the line that plots series $\{L_t\}_{t=2N-1}^{T}$.

4 Pivots

Pivots are levels that being the same over the same day, it utilises data from the previous day. Given the $\{x_t\}_{t=1}^{T}$ we have, we divide them into days. Say for some day d we have time interval $\{t_1, ..., t_2\}$ thus for the next day $d+1$ we have time interval $\{t_2+1, ..., t_3\}$.

Pivots include three key levels: Pivot (P_d), Supports ($S1_d$, $S2_d$), and Resistances ($R1_d$, $R2_d$).

4.1 Pivot point

There are three values we need to care about: yesterday's high (H_d), low (L_d), and close (C_d), defined as follows:

$$H_d = max_{t\in\{t_1,...,t_2\}} x_t \tag{5}$$
$$L_d = min_{t\in\{t_1,...,t_2\}} x_t \tag{6}$$
$$C_d = x_{t_2} \tag{7}$$

Now, pivot point is

$$P_{d+1} = \frac{1}{3}(H_d + L_d + C_d) \tag{8}$$

Notice that, the pivot shown on the graph shall be a horizontal line that values P_{d+1} for all times in $\{t_2+1, ..., t_3\}$. Same applies to resistances and supports.

4.2 Supports

$$S1_{d+1} = 2 \times P_{d+1} - H_d \tag{9}$$
$$S2_{d+1} = P_{d+1} - H_d + L_d \tag{10}$$

4.3 Resistances

$$R1_{d+1} = 2 \times P_{d+1} - L_d \tag{11}$$
$$R2_{d+1} = P_{d+1} + H_d - L_d \tag{12}$$