Factors Added

1. Price Based

- `From Return_Based.py Import Price_Based_Factors`
- `Return_Based_Factors(universe, date, benchmark)`

1. `Return_Based_Factors.M12_L1()`
   - 12 month momentum lagged 1 month
2. `Return_Based_Factors.M6_L1()`
   - 6 month momentum lagged 1 month
3. `Return_Based_Factors.MR1()`
   - 1 month mean reversion. negative of the return realised in past 20 days.
4. `Return_Based_Factors.IR12_L1()`
   - 12 months Information Ratio.

$$IR12\_L1_t = \left[\frac{\sum_{i=1}^{N} r_{diff}}{\sqrt{\sum_{i=1}^{N}(r_{diff} - \bar{r}_{diff})^2}}\right]_{t-20} \quad ; N = 250,\ lag = 20 \qquad \text{(Eq. 4.0)}$$

   where r_{diff} = return of stock minus return of benchmark
5. `Return_Based_Factors.IR6_L1()`
   - Same as (Eq. 4.0) but with $N = 125$
6. `Return_Based_Factors.JA12_L1()`
   - 12 months Jensen's Alpha

$$JA12\_L1_t = \left[\frac{\sum_{i=1}^{N} r_{diff}}{N}\right]_{t-20} \quad ; N = 250,\ lag = 20 \qquad \text{(Eq. 6.0)}$$

   where r_{diff} = return of stock minus return of (beta $\times$ benchmark)
7. `Return_Based_Factors.JA6_L1()`
   - Same as (Eq. 6.0) but with $N = 125$
8. `Return_Based_Factors.JAV12_L1()`
   - 12 months Vol-adjusted Jensen's Alpha

$$JA12\_L1_t = \left[\frac{\sum r_{diff}}{\sqrt{\sum(r_{diff} - \bar{r}_{diff})^2}}\right]_{t-lag} \quad ; N = 250,\ lag = 20 \qquad \text{(Eq. 8.0)}$$

9. `Return_Based_Factors.JAV6_L1()`
   - Same as (Eq. 8.0) but with $N = 125$
10. `Return_Based_Factors.BB()`
    - Based on Bollinger Band.

$$BB_t = \begin{cases} 1 & \text{if } C_{t-lag} > UB_{t-lag} \\ -1 & \text{if} C_{t-lag} < LB_{t-lag} \\ 0 & \text{otherwise} \end{cases} \quad ; lag = 5 \qquad \text{(Eq. 10.0)}$$

    where

$$UB_t = MA_t + \sigma_t$$
$$LB_t = MA_t - \sigma_t$$

    where $MA_t = 20$ Days Moving Average of prices and $\sigma_t =$ vol of daily change of prices
11. `Return_Based_Factors.CB()`
    - Based on Channel Breakout.

$$CB_t = \begin{cases} 1 & \text{if } C_{t-lag} > HH_{t-lag} \\ -1 & \text{if} C_{t-lag} < LL_{t-lag} \\ 0 & \text{otherwise} \end{cases} \quad ; lag = 5 \tag{Eq. 11.0}$$

where HH = Highest closing in previous 60 days and LL = Lowest closing in previous 60 days

12. `Return_Based_Factors.EWMAC100()`
    - Based on Moving Average Crossover.

$$EWMAC_t = \frac{\frac{Fast_t}{Slow_t} - 1}{\sigma_t} \tag{Eq. 12.0}$$

where $Slow_t$ = 100 Days Moving Average of closing price and $Fast_t = \frac{100}{4}$ Days Moving Average of closing price

13. `Return_Based_Factors.EWMAC250()`
    - Same (Eq. 12.0) but with 250 Days lookback.
14. `Return_Based_Factors.RSI()`
    - Based on RSI indicator.

$$RSI_t = 100 - \frac{100}{1 - \frac{UP_t}{DOWN_t}} \tag{Eq. 13.0}$$

where UP_t = average increase on +ve days in lookback period and
$DOWN_t$ = average decrease on -ve days in lookback period

2. Vol/Risk Based

- `From Volatility.py Import Vol_Risk_Based_Factors`
- `Vol_Risk_Based_Factors(universe, date, benchmark)`

15. `Vol_Risk_Based_Factors.BAB()`
    - Based on Betting Against Beta factor

$$BAB_t = \frac{1}{\beta_t} \quad \text{;where} \quad \beta_t = \frac{Cov(r_i, r_B)}{V(r_B)} \quad ; N = 250 \tag{Eq. 15.0}$$

16. `Vol_Risk_Based_Factors.VOL()`
    - Based on Low Risk factor

$$VOL_t = \frac{1}{\sqrt{V(r_i)}} \tag{16.0}$$

17. `Vol_Risk_Based_Factors.RES_VOL()`
    - Based on CAPM Residual Volatility

$$RES\_VOL = \frac{1}{\sqrt{V(r_{i,R})}} \quad \text{;where } V(r_{i,R}) = \text{Variance of benchmark-beta-adjusted return} \tag{17.0}$$

3. Value

- `From Value.py Import Valuation_Based_Factors`
- `Valuation_Based_Factors(universe, date)`

18. `Valuation_Based_Factors.PB()`
    - Price to Book
19. `Valuation_Based_Factors.DY()`
    - Dividend Yield
20. `Valuation_Based_Factors.EV_NS()`
    - Enterprise Value to Net Sales
21. `Valuation_Based_Factors.EV_EBIT()`
    - EV to EBIT
22. `Valuation_Based_Factors.EV_EBITDA()`

- EV to EBITDA

23. `Valuation_Based_Factors.P_CF()`
    - Price to Cash Flow
24. `Valuation_Based_Factors.FCFY()`
    - Free Cash Flow Yield

4. Quality

- `From Quality.py Import Quality_Based_Factors`
- `Quality_Based_Factors(universe, date)`

25. `Quality_Based_Factors.DP()`
    - Dividend Payout Ratio
26. `Quality_Based_Factors.GPM()`
    - Gross Profit Margin
27. `Quality_Based_Factors.PTM()`
    - Pre-Tax Margin
28. `Quality_Based_Factors.PATM()`
    - Profit After Tax Margin
29. `Quality_Based_Factors.ROA()`
    - Return on Assets
30. `Quality_Based_Factors.ROE()`
    - Return on Equity
31. `Quality_Based_Factors.ROCE()`
    - Return on Capital Employed
32. `Quality_Based_Factors.AT()`
    - Asset Turnover
33. `Quality_Based_Factors.DE()`
    - Debt-to-Equity
34. `Quality_Based_Factors.SCF()`
    - Sales-to-Cash Flow