

## Trend Scoring Algorithm Description (v2)

**Objective:** To calculate a composite trend score for each S&P 500 stock, identifying and quantifying the strength and direction of the current trend, and finally normalizing the scores for ranking.

### I. Core Scoring Indicators & Calculation:

The algorithm scores the latest status of the following five technical indicators:

#### 1. Moving Averages (MA):

- **Calculation:** Gets the stock's latest adjusted closing price (AdjClose) and calculates its 50-day Simple Moving Average (SMA50) and 200-day Simple Moving Average (SMA200). These are based on AdjClose.
- **Purpose:** To determine the medium-to-long-term trend direction (Golden Cross/Death Cross pattern) and the current price's position relative to these trend lines.

#### 2. Moving Average Convergence Divergence (MACD):

- **Calculation:** Calculates the standard MACD(12, 26, 9) indicator, yielding the MACD line (MACD\_12\_26\_9) and the Signal line (MACDs\_12\_26\_9). Based on AdjClose.
- **Purpose:** To measure changes in price momentum, strength, and direction.

#### 3. Average Directional Index (ADX):

- **Calculation:** Calculates the ADX(14) indicator, yielding the ADX line (ADX\_14), the Positive Directional Indicator (+DI, DMP\_14), and the Negative Directional Indicator (-DI, DMN\_14). Based on High, Low, and Close prices.
- **Purpose:** To measure the strength of the current trend (regardless of direction). ADX > 25 typically indicates a clear trend. The relative strength of +DI and -DI indicates the trend's direction.

#### 4. Relative Strength Index (RSI):

- **Calculation:** Calculates the RSI(14) indicator (RSI\_14). Based on AdjClose.
- **Purpose:** To measure the speed and magnitude of recent price changes, helping to confirm trend momentum.

#### 5. On-Balance Volume (OBV):

- **Calculation:** Calculates the OBV indicator (OBV) and further calculates a Simple Moving Average of the OBV itself (OBV SMA). The period for the SMA is determined by obv\_sma\_period in config\_trend.ini (default is 20). Based on AdjClose and Volume.
- **Purpose:** To confirm price trends using volume changes. Rising OBV typically confirms an uptrend, and vice versa. Comparing OBV to its SMA indicates the

recent OBV trend.

## II. Trend Scoring Rules:

Based on the latest values of the indicators, individual raw scores are calculated for each stock as follows:

### 1. **MA Score (MA\_Score) [-3, +3]:**

- +3: Price > SMA50 **AND** SMA50 > SMA200 (Strong confirmed uptrend)
- +1: Price > SMA50 **BUT** SMA50 < SMA200 (Potential reversal / early uptrend)
- -1: Price < SMA50 **BUT** SMA50 > SMA200 (Potential pullback / early downtrend)
- -3: Price < SMA50 **AND** SMA50 < SMA200 (Strong confirmed downtrend)
- 0: Other cases (e.g., price exactly on SMA)

### 2. **MACD Score (MACD\_Score) [-2, +2]:**

- +2: MACD Line > Signal Line **AND** MACD Line > 0 (Strong bullish momentum)
- +1: MACD Line > Signal Line **BUT** MACD Line < 0 (Weakening bearish momentum / potential bullish reversal)
- -1: MACD Line < Signal Line **BUT** MACD Line > 0 (Weakening bullish momentum / potential bearish reversal)
- -2: MACD Line < Signal Line **AND** MACD Line < 0 (Strong bearish momentum)

### 3. **ADX Score (ADX\_Score) [-2, 0, +2]:**

- +2: ADX > 25 **AND** +DI > -DI (Strong uptrend confirmed)
- -2: ADX > 25 **AND** -DI > +DI (Strong downtrend confirmed)
- 0: ADX <= 25 (Weak trend or ranging market)

### 4. **RSI Score (RSI\_Score) [-1, 0, +1]:**

- +1: RSI > 55 (Supporting bullish momentum)
- -1: RSI < 45 (Supporting bearish momentum)
- 0: 45 <= RSI <= 55 (Neutral momentum)

### 5. **OBV Score (OBV\_Score) [-1, 0, +1]:**

- +1: Current OBV > OBV SMA (Volume confirms recent strength)
- -1: Current OBV < OBV SMA (Volume confirms recent weakness)
- 0: Current OBV = OBV SMA (Neutral volume pressure)

## III. Final Trend Score Calculation:

### 1. **Weighted Raw Score (Weighted\_Raw\_Score):**

- The five individual scores (MA\_Score, MACD\_Score, ADX\_Score, RSI\_Score, OBV\_Score) are summed using weights defined in the [Calculate\_trend] section of config\_trend.ini (w\_ma, w\_macd, w\_adx, w\_rsi, w\_obv).
- $\text{Weighted\_Raw\_Score} = (w\_ma * \text{MA\_Score}) + (w\_macd * \text{MACD\_Score}) + \dots + (w\_obv * \text{OBV\_Score})$

## 2. **Normalized Trend Score (Normalized\_Trend\_Score) [0, 100]:**

- After calculating the Weighted\_Raw\_Score for all stocks, these raw scores undergo **Min-Max Scaling** to linearly map them to a range of 0 to 100.
- $\text{Normalized\_Trend\_Score} = ((\text{Raw Score} - \text{Min Raw Score}) / (\text{Max Raw Score} - \text{Min Raw Score})) * 100$
- This normalized score is the final output saved to the Excel file for comparison and ranking. A higher score indicates a stronger composite uptrend based on this model.

**Note:** This model relies on historical data, and indicators are lagging. Scores should be used in conjunction with other analysis methods and do not constitute investment advice.