

Stock Sentiment Service User Guide

The Stock Sentiment service is a tool equally useful for both stock and options traders as it provides you stock trend analysis based on a combination of historical, technical, options-derived and fundamental data. The service is comprised of 4 sections:

1. **Stock Sentiment Summary** – stock trend analysis summary. The summary is based on Implied and Realized figures as well as Technical Analysis Indicators.
2. **Interactive Price Band Calculator** - allows you to estimate future stock price range for a given probability (calculated on the basis of historical or implied volatility) - commonly referred to as “Bollinger bands”.
3. **Interactive Technical Analysis Charts** - most popular and reliable TA indicators are charted; you have the ability to change an indicators’ term(s) to match your own trading horizons or just find the value that matches the best stock trend prediction.
4. **Stock Data** section - historical, fundamental and options-derived data is shown here.

We will describe these parts in more detail below.

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Stock Sentiment Summary

The Stock Sentiment Summary is computer generated buy/sell signals based on Implied and Realized figures as well as Technical Analysis Indicators. Those signals are based on mathematical equations, no human influence is involved. If you have enough experience in market data interpretation you can think of your own ‘theory’ to generate such signals - our mission is to help you to make a first step in this direction (and may be you don’t need to go further at all). We will also provide you with necessary tools – technical analysis charts and major quantitative indicators.

The summary has three parts:

1. **Sentiment in Brief** - an executive summary of stock sentiment, taking into account stock implied, realized volatility, and technical analysis data
2. **Stock Snapshot** – signals based on implied (if the stock is optionable) and realized data presented in the [Stock Data](#) section.
3. **Technical indicators summary** are tech. analysis based signals – you can fine-tune these signals using our interactive charts.

Sentiment in Brief

Sentiment in Brief

 [Service user guide in PDF format \(Adobe Acrobat Reader required\)](#)

Sentiment	Bullish rank	Volatile Rank	Buy	Sell	Hold
moderately bullish, unclear	11.11%	0.00%	3	2	4

Sentiment in Brief is a table summarizing all the available stock data into a couple of fields: Sentiment, Bullish Rank, Volatile Rank, Buy, Sell and Hold. We will further describe each of these fields below.

Sentiment

Sentiment shows a brief verbal summary of the expected direction of a stock, and the scale of expected stock price moves (volatility). It is based on the Bullish Rank and Volatile Rank values shown to its right. Direction sentiment can be either strong bullish, bullish, moderately bullish, neutral, moderately bearish, bearish and strong bearish; Volatility sentiment can be either extremely volatile, volatile, slightly volatile, volatility unclear, rather quiet, quiet and absolutely still.

Bullish Rank

Bullish Rank shows how bullish the market expectations on the stock are, 100% being absolutely bullish and -100% - absolutely bearish. This value is calculated using number of Buy/Sell/Hold signals to the right as follows: $\text{Bullish Rank} = 100\% * (\text{Buy} - \text{Sell}) / (\text{Buy} + \text{Sell} + \text{Hold})$. So, the stock is expected to be Bullish when the number of Buy signals is larger than number of Sell and Hold ones.

Volatile Rank

Volatile Rank shows how volatile the stock is expected to be, 100% being extremely volatile and -100% - absolutely still. This value is calculated using the number of Buy/Sell/Hold signals to the right as follows: $\text{Volatile Rank} = 100\% * (2 * \min(\text{Buy}, \text{Sell}) - \text{Hold}) / (\text{Buy} + \text{Sell} + \text{Hold})$. So, the stock is expected to be Volatile when there is a larger number of both Buy and Sell signals than that of Hold ones.

Buy, Sell, Hold

This is a number of Buy, Sell and Hold signals calculated by the service, respectively. Each phrase in the Stock Snapshot and Tech Indicators Summary sections is a pretty self-explanatory quantitative; to make the interpretation even simpler we've added a thumbnail to each phrase that shows you a signal and/or any 'note'. Each green upward arrow in the Stock Snapshot and Tech Indicators Summary sections below counts as 1 Buy signal; green arrow with a thumb up - as 2 Buy signals. The same works for Sell - red downward arrow (1 Sell) and red arrow with a thumb down (2 Sell). Finally, each question mark sign in the Stock Snapshot and Tech Indicators Summary sections counts as 1 Hold signal.

👍 - confirmed upside trend, strong Buy (2 Buy signals)

👆 - upside trend, Buy (1 Buy signal)

👆? - questionable upside trend - Buy or Hold, depending on your risk preferences (1 Buy and 1 Hold signal)

? - the trend is unclear, Hold (1 Hold signal)

! - attention (you need to read the phrase to the left of thumbnail to see what is going on) (no additional Buy/Sell/Hold signals)

👇? - questionable downside trend - Sell or Hold, depending on your risk preferences (1 Sell and 1 Hold signal)

👇 - downside trend, Sell (1 Sell signal)

👇👎 - confirmed downside trend, strong Sell (2 Sell signals)

Well, it is not uncommon of course, when you see different indicators contradict each other. In this case you should decide for yourself which signals are most reliable and/or important for you. Or, maybe, this contradiction reflects the unclear market sentiment on the stock, so any action other than “Hold” are quite risky.

Below we will describe the ‘logic’ behind each of those signals.

Stock Snapshot

See below a sample of Stock Snapshot summary:

Stock Snapshot

MSFT:NASDAQ price advanced from the open by 0.70 % and advanced from previous close by 120.41 % with a moderate daily swing of 1.60 %. Trading volume does not exceed much monthly average value and does not say anything definite on the stocks's short-term behavior. 📈?

Note that the price is playing with 1 year resistance level right now. Positive HV term structure gives evidence that current trend could stand for a while. Though, relatively high correlation with the market suggests that it can be affected by general market movements. 📈

Quite high Call / Put trading volume ratio of 1.47 suggests that the stock is probably overbought. IVX term structure does not show any difference between long and short term expectations. 📉

It consists of 3 distinct phrases based on specific variable. Let's look at each phrase in more detail.

Phrase 1 - very short term perspective

To build this phrase we look at last close price, open price and previous day close, limiting the perspective to 1 day frame. If the stock advanced from previous close, and advanced from open as well, a “Buy” signal is generated.

Further, daily stock trading volume exceeding monthly average is considered an uptrend confirmation which makes the signal “Strong”. In other case (lower volume), the “trend is questionable”. For indexes not having the volume, the “strong” / “questionable” specification is not available.

Same rules are applicable for “Sell” signals. Finally, if the stock price “whipsaws” (does not show the continuous advance or decline) we just show a “trend is unclear” signal.

Phrase 2 - support / resistance confirmation or breakdown

This signal is a bit more advanced and takes into account the following factors: price proximity to 1 year support or resistance level (Low or High), distribution of Historical Volatility (HV) as a function of HV term (so called ‘HV term structure’) and equity price correlation with the market.

First, we inspect if the stock price is close to its 1 year High / Low range boundaries - the main criteria here. If yes, we try to determine if stock price is going to breach this boundary. We use HV distribution to find that out. Value of HV increasing with HV term increase (positive HV term structure) indicates that stock price become less and less volatile – that is, current trend is expected to continue. Decreasing HV value with HV term increase (negative HV term structure) indicates that price reversion to the mean is quite likely.

All possible combinations of current stock price level and HV term structure can be interpreted as follows:

- stock price near resistance level, positive HV term structure - stock advances and is going to breach the resistance level (Buy signal)
- stock price near resistance level, negative HV term structure - stock advances, but is not going to breach the resistance level - rather it would fall back to the mean quite soon (Sell signal)
- stock price near support level, positive HV term structure - stock declines and is going to breach the support level (Sell signal)
- stock price near support level, negative HV term structure - stock declines but is not going to breach the support level - rather it would rise back to the mean quite soon (Buy signal)
- “flat” HV term structure, independently of price level – stock trend undefined (Hold signal)
- stock price is quite far from support and resistance levels, positive HV term structure - current stock trend seems to endure, whatever it is (Alarm signal)
- stock price is quite far from support and resistance levels, negative HV term structure - current stock trend is about to change (Alarm signal)

Finally, we add “strong” adjective to Buy or Sell signal if stock price correlation with the market is low (so that general market movements are unlikely to affect stock’s behavior much). If correlation is quite high the stock is too market-dependant and the signal cannot be confirmed.

Phrase 3 - options-derived information

As you might suspect, the stock options market can be used as additional input for stock performance analysis (and vice versa of course). In our study we picked just two parameters: options Call / Put trading volume ratio and distribution of Implied Volatility Index (IVX) as a function of IVX term (or IV Index term structure)

The first one is supposed to be a contrarian indicator: if there are too many Calls traded - the sentiment is “too” positive, and the stock is overbought. Too many Puts means oversold, on the contrary.

To confirm the signal issued by Call / Put ratio we check the IVX term structure. IV Index by itself is a “fear gauge” of the stock - high readings warn about high probability of the downside risk. “Flat” (almost constant) IVX term structure means that current trend will retain for a while – which considered as additional confirmation of the signal. In any other case, the “tentative” Buy / Sell is issued only.

Note that we never issue a “strong” Buy / Sell signal here, since Call / Put ratio indicator should be considered with care – different stocks can have different oversold / overbought level.

Tech Indicators Summary

Picture below shows a sample of the Tech Indicators Summary:

Tech Indicators Summary

The analysis of short and long term Exponential Moving Averages shows slightly positive, though tentative sentiment.	↑?
Current 14-day RSI reading of 61.01 % as well as its 2.16 % advance from yesterday paint quite clear bullish picture.	↑
Chaikin Money Flow (21-day CMF) indicator suggests a slight buying pressure, though its recent pattern is a bit discrepant.	↑?

Again we have 3 ‘signals’ each corresponding to a specific Technical Analysis chart. The thumbnail to the right expresses the signal in graphical format (with possible ‘attention’ indicator added)

Note: if you are not well acquainted with Technical Analysis Indicators we refer to, [Technical Analysis Charts](#) section below is worth reading first.

Phrase 1 - Exponential Moving Average indicator

This phrase (and signal) uses both short and long term EMAs, rather than one of them. Or in other words we’re using MACD indicator (Moving Average Convergence Divergence). MACD indicator is defined as a difference between short-term EMA and long-term EMA.

We examine the following:

- current MACD level: if it is sufficiently high, recent stock prices are higher than long term average, and the stock is probably experiencing its “good times”;
- MACD change from previous trading day: gives additional prove if MACD levels is high and keeps on moving higher.
- recent crossing of a short and long term EMAs: we consider that as a sign of trend confirmation. If short-term EMA line crosses long-term line from below a bullish trend is observed (and vice versa). “Recent” in our study means less than N days, where N is a short EMA term.

Thumbnail is generated using these simple rules: if all the three sides confirm each other, then it is “strong” Buy / Sell signal; two - “just” signal; one signal - “tentative”, no signal – trend is unclear. Note that current level and change from yesterday are considered neutral when they are of moderate magnitude - compared with short term EMA value.

Phrase 2 - Relative Strength Index indicator

For RSI we’re using similar approach:

- current level: is it bullish (above the centerline, but not close to “overbought” zone) or bearish
- change from previous trading day: does the stock regain strength or lose
- presence of recent extreme value, in overbought or oversold zone. Again, “recent” is in comparison with RSI term.

“Thumbnail logics” is exactly the same as for EMA.

Phrase 3 - Chaikin Money Flow indicator

Again, we’re using same approach here:

- current level: is it bullish (a bit above centerline) or bearish
- for how long the CMF stayed positive / negative “recently”
- “recent” observation of high/low CMF value is considered as clear bullish / bearish indicator

Same thumbnail logic is used here.

Price Band Calculator

This simple interactive calculator allows you to estimate probability of stock price being within certain bounds (Bollinger bands). The only input the Calculator expects from you is the date range and the level of volatility you expect. By default it estimates the price band for tomorrow, with 30-day IV Index value as volatility input (nearest term options). If a stock is not optionable, 10 day Historical Volatility is used instead.

Price Bands Calculator

Date: Volatility:

Price Range	Above	Below	Probability
1 STD	34.31	35.65	68.28%
2 STD	33.64	36.32	95.45%
3 STD	32.97	37.00	99.73%
Custom	<input type="text"/>	<input type="text"/>	0.00%

[Recalculate](#)

We advise you to use volatility terms corresponding to your trading horizon; keeping in mind that IV Index term is calendar days, and HV term - trading days. You can customize both horizon and volatility. You can also enter your own price band (in “Custom” line) - for example your target / stop loss levels etc. and get probability of stock price being within this range.

Technical Analysis Charts

We use 3 well-known Technical Analysis Indicators for our study:

1. Price candlesticks, along with Exponential Moving Averages (EMA)
2. Relative Strength Indicator (RSI)
3. Chaikin Money Flow (CMF)

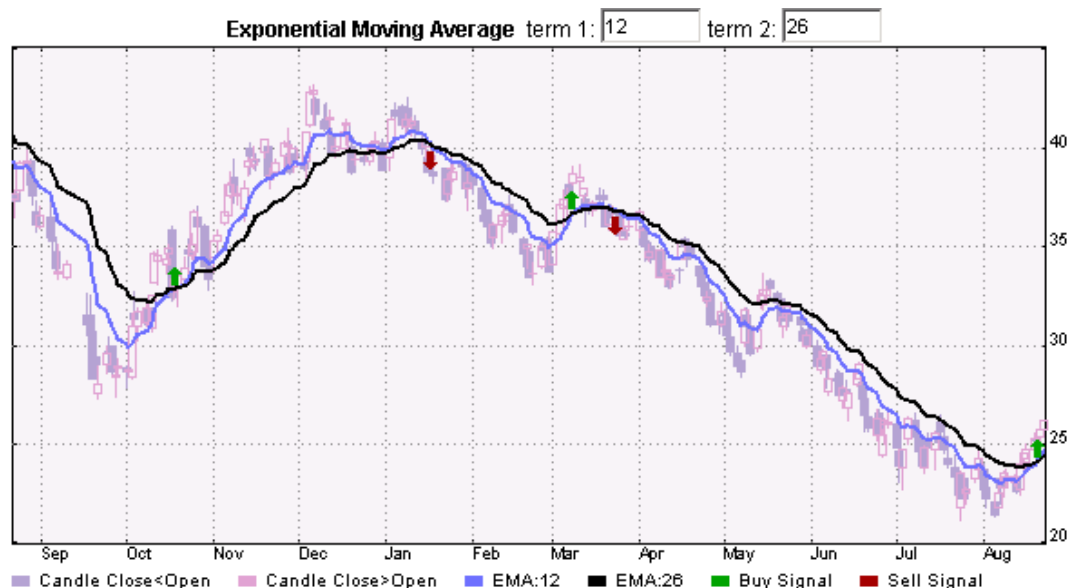
Thus we provide trading signals using 3 indicators of different nature - trend-following price indicator (EMA), momentum oscillator (RSI) and non-trend-following volume indicator (CMF).

Note that all the charts are slightly interactive:

- you can set custom terms to EMA, RSI and CMF (in days)
- of course, you can choose the time range to view (same for all charts)

Exponential Moving Average (EMA)

This is an average daily close value for N observations; the “exponential” part means that the weighting of prices is not uniform - larger weight is assigned to the most recent readings. This makes EMA more sensitive to nascent trend than just simple average. The bad news, though, is that short-term EMA is prone to whipsaws - so you need to choose term of EMA (number of days to use) carefully, to achieve a tradeoff between sensitivity and reliability. As a default we choose quite common values of 12 and 26 trading days for short-term and long-term EMA, respectively. You are welcome to play with these terms to make the trend identification more reliable. The difference between short-term and long-term price EMAs makes the other very popular indicator - MACD (Moving Average Convergence Divergence).



We show a Buy signal on chart when MACD changes sign from positive to negative (breaches zero level from above) and Sell signal when the sign is changed from negative to positive. Mind that this is only one of the ways to use EMA & MACD in decision making support. For example, in [Tech Indicators Summary](#) we also look at the current level of MACD and its change from yesterday as an additional confirmation.

Exact formula for EMA calculations is:

$$\text{EMA}(\text{today}) = k \cdot \text{Price}(\text{today}) + (1-k) \cdot \text{EMA}(\text{yesterday}) \quad (1)$$

where weighting coefficient k is simply related to N - number of observations:

$$k = 2 / (N + 1) \quad (2)$$

The “initial” EMA value (when you just do not have “yesterday’s” EMA) is calculated as simple average by n days:

$$\text{EMA}(\text{first}) = (\text{Price}(1) + \text{Price}(2) + \dots + \text{Price}(N)) / N \quad (3)$$

Starting from this first point, you can calculate EMA forward one-by-one using formula (1).

Note: Though formally current value of EMA is effectively based on all observations, price-weighting makes deep history observations less important. So if you take last two months data or the whole year data to calculate 5 day EMA the result will not much differ. For simplicity we take all the data available into calculation, independently of EMA term.

NB: Using of candlesticks, EMA and MACD is very well covered in numerous Technical Analysis books and online resources – our objective is just give you an intro here.

Relative Strength Indicator (RSI)

This indicator compares average gains with losses for some recent days; it ranges from 0 (continued decline) to 100 % (continued advance) and supposed to be a contrarian indicator at extreme points - so that very high readings suggest selling (under overbought conditions), and low readings - buying (oversold).

How we can interpret this indicator:

- RSI value greater than 70 % is considered to give the overbought signal, while lower than 30% - oversold. Note, however, that if you believe these numbers should be different for a specific stock our recommendations should be accordingly adjusted (see RSI signals logic description above)
- RSI value of 50 % is “neutral”; anything above this level is considered bullish (until the overbought zone is reached) and below - bearish (until oversold zone is reached).



The calculation of this indicator is a bit more tedious than EMA. First, you need to calculate today's Average Gain and Average Loss. Their calculation is quite similar to the calculation of EMA:

$$\begin{aligned} \text{Average Gain}(\text{today}) &= k * \text{Gain}(\text{today}) + (1-k) * \text{Average Gain}(\text{yesterday}) \\ \text{Average Loss}(\text{today}) &= k * \text{Loss}(\text{today}) + (1-k) * \text{Average Loss}(\text{yesterday}) \end{aligned} \quad (1)$$

where coefficient k is again related to number of days in a term N:

$$k = 1 / N \quad (2)$$

Gain and Loss as of today are just change in closing price from yesterday. If price advances from yesterday, the Gain is positive, and Loss equals to zero; if, on the contrary, price declines, the Gain is zero, and Loss is a positive (not negative!) figure.

Again, the "initial" value of Average Gain / Loss is calculated as a simple average of Gains & Losses:

$$\begin{aligned} \text{Average Gain}(\text{first}) &= (\text{Gain} (1) + \text{Gain} (2) + \dots + \text{Gain}(N)) / N \\ \text{Average Loss}(\text{first}) &= (\text{Loss} (1) + \text{Loss} (2) + \dots + \text{Loss} (N)) / N \end{aligned} \quad (3)$$

Starting from this point you can calculate Average Gain / Loss forward one-by-one, using formula (1).

Nobody knows the "best" term N beforehand - we take the conventional value of 14 days (close to 3 calendar weeks). You may choose your own term of course.

The rest is simple, to calculate RSI we just have to get (Average) Gains ratio to summary Gains and Losses:

$$\text{RSI}(\text{today}) = 100 \% * \text{Average Gain}(\text{today}) / (\text{Average Gain}(\text{today}) + \text{Average Loss}(\text{today})) \quad (4)$$

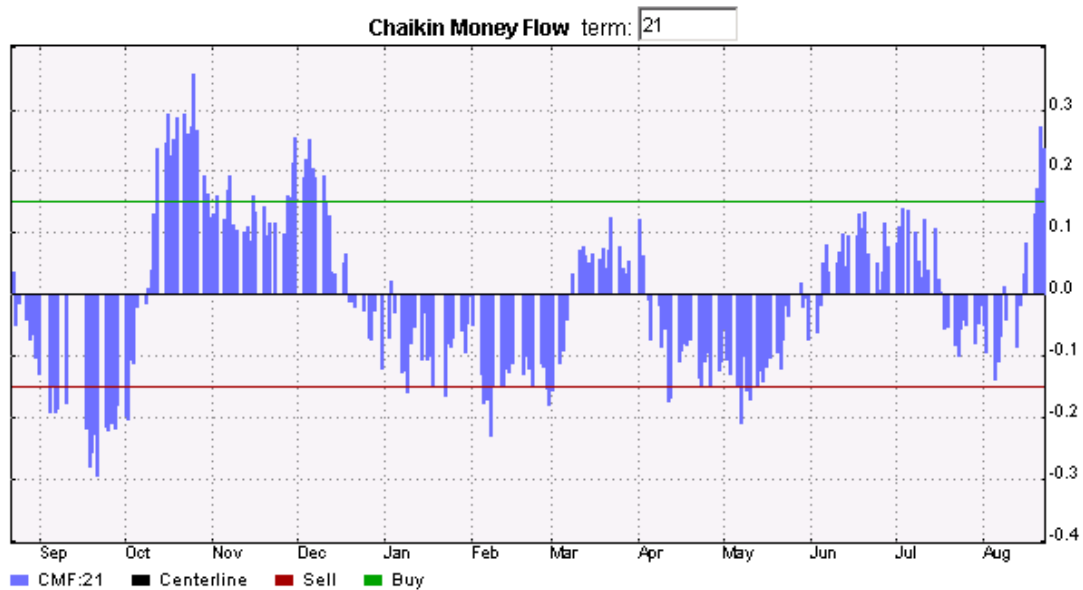
Formula interpretation is quite simple – successive Gains result in RSI value close to 100 %, Losses produces zero (or close) value. Mind that very high readings of the indicator yield overbought signal, and low – oversold. Default overbought/oversold lines are shown on the chart as well.

In the [Tech Indicator Summary](#), we show the Buy / Sell signal based on the current level of RSI, change from yesterday, and proximity to 30 %/70 % levels.

Chaikin Money Flow (CMF)

Chaikin Money Flow indicator determines the buying / selling pressure based on the average value of Accumulation / Distribution Line indicator. This indicator is based on end-of-day close price within its daily high/low range and daily trades volume. Indicator oscillates between -1 and +1 and can be read as follows:

- extreme value of +1 means that each day in the period the stock closed at its high - means continuous stock advance, assuming no gaps
- the other extreme, -1 means each day closing at the low
- in fact, the much lesser values of +0.15 / -0.15 are considered to be sufficient indication of bullish / bearish sentiment (see more details below)
- note that the longer the indicator keeps its positive (negative) sign the more accumulation (distribution) is and as a result positive (negative) sentiment.



The calculation of this indicator is very simple. First, you need to calculate the so-called Closing Value

$$\text{Closing Value} = [(C - L) - (H - C)] / (H - L) \quad (1)$$

where **C**, **H** and **L** - daily Close, High and Low prices, respectively. It is 1 if the stock closes at its high and -1 when it closes at low; zero Closing Value means that the close price is the High/Low average. This value multiplied by trading volume yields the Accumulation / Distribution Line (ADL) :

$$\text{ADL} = \text{Closing Value} * \text{Volume} \quad (2)$$

Now, Chaikin Money Flow of term N is just a simple moving average of Accumulation / Distribution Line over last N trading days, normalized by average trading volume :

$$\text{CMF} = \text{average(ADL)} / \text{average(Volume)} \quad (3)$$

As always the “best” N is stock specific, we use N = 21 trading days - that is about one calendar month.

CMF value ranges from -1 to 1, and its values are commonly read as follows:

- 0.2 ... 0.25 (and further up) - bullish to strong bullish
- 0.1 ... 0.15 - moderately bullish to bullish
- 0.1 ... -0.15 - moderately bearish to bearish
- 0.2 ... -0.25 (and further down) - bearish to strong bearish

On the chart we show the 'signal' levels of -0.15 and 0.15.

In the [Tech Indicator Summary](#) we show the Buy / Sell signal based on current CMF level, presence of recent large CMF readings above 0.15 or below -0.15, and degree of CMF level "continuance".

Stock Data section

The Stock Data section contains enough information to help you estimate stock prospects. We group it in 5 sections.

1. Fundamental stock information – end-of-day prices, change since yesterday, volume, dividends, capitalization and more:

Basic Data			
Open:	34.35	Volume:	16702
High:	35.70	52 wk High:	50.00/27-Mar-02
Low:	33.95	52 wk Low:	26.73/07-Oct-02
Close:	35.18	Avg 1m Volume:	32376
Prev Close:	32.86	Div Yield:	2.27%
Change:	7.06%	Div Frequency:	Quarterly
Capitalization:	180.85 bln	Dividend/Date:	0.20/28-Jan-03

2. Correlation against the market - though using correlation in trading is rather advanced topic it is always good to know how the stock behavior is affected by general market movements. This section shows 252-day price return correlations against major market indexes. High readings (close to 100 %) warn that the stock is highly influenced by the market, while low readings indicate that stock generally moves by itself, disregarding general conditions. Negative correlation (rarely observed) means that stock is being moving against the market now.

Correlation against market	
SPX	87.87%
DJX	82.53%
NDX	97.71%
OEX	86.45%

3. Historical Volatility (HV) shows how "volatile" stock was for the last 10, 30, 60 and 180 trading days. The higher volatility is the more "unsteady" the stock is. To get a feeling of how current HV looks you can also compare it against last year 'extreme' values. Zero value means that the stock is heating its 'low' HV boundary now while value of 1 (or close to it) shows that the stock is at the peak of its volatility.

Historical volatility			
Term	HV	Prev day HV	HV in 52 wk range
10	41.17%	39.49%	0.38
30	36.56%	37.61%	0.30
60	40.64%	40.28%	0.47
180	44.52%	44.35%	0.75

4. Options derived data section contains current options' Open Interest and average Call/Put Volume ratio. The latter is a well-known contrarian indicator - high readings imply that the stock is overbought, and low - oversold. Mind that you should use this indicator with caution – any trend suggested better be confirmed by some other indicator.

Options-derived data	
Open Interest	Avg 1 m C/P volume ratio
4588528	1.64

5. Implied Volatility Index (IV Index) is another options-derived indicator. This is an indicator of stock's implied volatility. High level of IV Index means high risk - you can also assess market estimate of risk distribution for different time horizons by looking at IV Index term structure.

Implied Volatility Index			
Term	IV Index	Prev day IV Index	IV Index in 52 wk range
30	41.97%	41.31%	0.37
60	41.92%	41.35%	0.45
90	41.72%	40.88%	0.49
180	39.98%	39.35%	0.53

Finally, you can find detailed information about all variables we use in this section in our Knowledge Base (http://www.ivolatility.com/info/help_system.html).