Algorithmic Trading Systems Based on Google Trends

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- Carmen de la Orden de la Cruz
About Us

**Investigation:**
Research Line: “Economía Emocional” related to Behavioral Finance and Investors’ Mood

**Technology:**
Elaboration for financial products and service form previous research

- Big Data algorithmic trading systems based on IA models using exclusively Investors’ Mood
Conceptual Framework

1.- *Changes in investors’ mood provide evidence of anomalies in the behavior of stock markets* (Nofsinger, 2005, Corredor, Ferrer and Santamaría, 2013)

We observe these changes in:

- Weather (Hirshleifer and Shumway, 2003, Jacobsen and Marquering, 2008)
- Seasonal patterns like vacations “sell in May and go away” or the “Halloween” effect (Bouman and Jacobsen, 2002; Marshall 2010)
- Moon (Yuan, Zheng and Zhu, 2006)
- Sports results (Edmans, García and Norli, 2007; Chang, Chen, Chou and Lin, 2012; Berument, Ceylan and Gozpınar, 2006; Kaplanski and Levy, 2010; Mishra and Smyth, 2010; Gómez and Prado, 2014).

2.- *How to measure mood to predict market trends* (Hilton, 2001) Big Data approach:

- Wu et al. (2013) use big data to predict market volatility,
- Moat et al. (2013) use Wikipedia to determine investor feelings,
Hypothesis and Data

H$_1$: A big data algorithmic trading system based on artificial intelligence models over investors’ mood using Google Trends can generate positive returns.

We will validate this hypothesis if we reach three evidences:
1. Profit/Loss amount is positive including license costs and trading commissions.
2. Success rate is higher than 50%
3. Profit factor is higher than 1

Google Trends: Data available from 2004 in a monthly base.

Prospective analysis starts in January 2017 and ends in February 2018

All the quotes and stats used in this study has been provided by Trading Motion. [https://www.tradingmotion.com/](https://www.tradingmotion.com/)

The Data Mining tool used has been dVelox developed by Apara. [http://www.apara.es/es/](http://www.apara.es/es/)
Methodology

Data publication

Google Trends

Google search statistics of economic and financial terms that are correlated with the evolution of the market

Training

With the available data, a model is constructed that explains the evolution of the index

Two stages.
1. Training
2. Optimization

Prediction

Prediction for the next month

Trading

Swing trading systems maintain long or short position depending on the prediction of the previous model
Results

Example of Bayesian Network Trained (Google Trends Monthly Nasdaq)
Results

Performance of Google Trends Monthly

Table 1. Performance of Big Data trading algorithmic systems on Investors’ Mood

<table>
<thead>
<tr>
<th>Index</th>
<th>Profit/Loss</th>
<th>Success rate</th>
<th>Profit Factor</th>
<th>Sharpe Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ibex 35</td>
<td>-824,00 €</td>
<td>47,80%</td>
<td>0,99</td>
<td>-0,64</td>
</tr>
<tr>
<td>Eursotoxx50</td>
<td>-560,00 €</td>
<td>50,50%</td>
<td>1,00</td>
<td>-0,12</td>
</tr>
<tr>
<td>Dow Jones</td>
<td>16.919,00 €</td>
<td>58,20%</td>
<td>1,36</td>
<td>1,52</td>
</tr>
<tr>
<td>S&amp;P 500</td>
<td>20.803,00 €</td>
<td>60,70%</td>
<td>1,44</td>
<td>1,86</td>
</tr>
<tr>
<td>Nasdaq</td>
<td>34.628,00 €</td>
<td>62.40%</td>
<td>1,54</td>
<td>2,43</td>
</tr>
</tbody>
</table>

Source: Trading Motion (2018)
Conclusions

In this study, we used an innovative approach to check the capability of the behavioral finance and the Investors’ Mood to predict the evolution of the financial markets.

We can check that these “pure investors’ sentiment” systems can be profitable for the American indexes while the result is poor for European ones.

1. Google Trends is a good investors’ sentiment metric for the American indexes studied, closer than global sentiment if Google Trends has been no limited by location. The poor results for Ibex or Eursotoxx suggests a limitation in Google Trends stats for this models in further investigation.

2. Trading systems can be developed using an alternative approach to common systems based on technical analysis. This study has shown how the trading system for Dow Jones, S&P 500 and Nasdaq, based on the predictions of an artificial intelligence model that uses investors’ mood from Google Trends to predict is capable to generate positive returns in a long/short strategy.
## Next step

<table>
<thead>
<tr>
<th>Sistema</th>
<th>Producto</th>
<th>Tipo</th>
<th>Desarrollador</th>
<th>Fecha inicio</th>
<th>Resultado Total</th>
<th>Sesiones Ganadoras</th>
<th>Profit Factor</th>
<th>ROI Anualizado</th>
<th>Peer Drawdown</th>
<th>Capital requerido</th>
<th>Ratio Sharpe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Google Trends Monthly NQ</td>
<td>NQ</td>
<td>C</td>
<td>InvestMood</td>
<td>02/2004</td>
<td>218301 €</td>
<td>55.9%</td>
<td>1.41</td>
<td>+30.2%</td>
<td>-11259 €</td>
<td>6800 €</td>
<td>1.6043</td>
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<tr>
<td>Google Trends Monthly ES</td>
<td>ES</td>
<td>C</td>
<td>InvestMood</td>
<td>02/2004</td>
<td>186627 €</td>
<td>55.9%</td>
<td>1.30</td>
<td>+23.5%</td>
<td>-13462 €</td>
<td>6800 €</td>
<td>1.1403</td>
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<tr>
<td>Google Trends Monthly DJ</td>
<td>YM</td>
<td>C</td>
<td>InvestMood</td>
<td>02/2004</td>
<td>159841 €</td>
<td>55.7%</td>
<td>1.30</td>
<td>+18.5%</td>
<td>-12230 €</td>
<td>7000 €</td>
<td>1.1674</td>
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<tr>
<td>Google Trends Monthly GC</td>
<td>GC</td>
<td>C</td>
<td>InvestMood</td>
<td>12/2006</td>
<td>335051 €</td>
<td>54.9%</td>
<td>1.32</td>
<td>+17.5%</td>
<td>-19707 €</td>
<td>20200 €</td>
<td>0.9089</td>
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<tr>
<td>Google Trends Monthly IBEX</td>
<td>MN</td>
<td>C</td>
<td>InvestMood</td>
<td>02/2004</td>
<td>45221 €</td>
<td>54.2%</td>
<td>1.34</td>
<td>+20.9%</td>
<td>-3719 €</td>
<td>1600 €</td>
<td>1.2647</td>
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<tr>
<td>Google Trends Monthly FDXM</td>
<td>FDXM</td>
<td>C</td>
<td>InvestMood</td>
<td>02/2004</td>
<td>185430 €</td>
<td>56.2%</td>
<td>1.37</td>
<td>+32.1%</td>
<td>-10582 €</td>
<td>5800 €</td>
<td>1.6721</td>
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<tr>
<td>Google Trends Monthly QM</td>
<td>QM</td>
<td>C</td>
<td>InvestMood</td>
<td>02/2004</td>
<td>221477 €</td>
<td>54.9%</td>
<td>1.35</td>
<td>+43.8%</td>
<td>-10290 €</td>
<td>3800 €</td>
<td>1.6781</td>
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<td>Google Trends Monthly FESX</td>
<td>FESX</td>
<td>C</td>
<td>InvestMood</td>
<td>02/2004</td>
<td>21958 €</td>
<td>50.1%</td>
<td>1.06</td>
<td>+3.04%</td>
<td>-16256 €</td>
<td>4300 €</td>
<td>0.1617</td>
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</table>

[https://www.tradingmotion.com/Strategies/Explore](https://www.tradingmotion.com/Strategies/Explore)
Next step

Google Trends Monthly NQ

<table>
<thead>
<tr>
<th>Resultado Total desde 02/02/2004</th>
<th>Resultado Verificado desde 01/04/2017</th>
<th>Resultado Live desde 07/12/2017</th>
<th>Peor Drawdown</th>
<th>Capital Sugerido</th>
<th>Capital Requerido</th>
</tr>
</thead>
<tbody>
<tr>
<td>218301 € (+30.2%)</td>
<td>41324 €</td>
<td>26591 €</td>
<td>-11259 €</td>
<td>50000 €</td>
<td>8800 €</td>
</tr>
</tbody>
</table>

Estadísticas 07/12/2017 - 06/07/2018

- Sesiones Analizadas: 151
- Sesiones Ganadoras: 55.7%
- Peor Drawdown: -11259 € (08/02/2018)
- Resultado Total: 26591 €
- Racha Beneficios Actual: 26157 €
- Drawdown Actual: -1489 € (21/06/2018)
- ROI Anualizado: +52.0%
- Mejor Sesión: 3616 € (27/03/2018)
- Peor Sesión: -4598 € (05/02/2018)
- Profit Factor: 1.45
- Promedio Sesión Ganadora: 1847.58 €
- Promedio Sesión Perdida: -909.34 €
- Comisión por contrato: $8.00
- % Tiempo con Posición Abierta: 100%
- Slippage por contrato: -0.2445 (4.01 €)
- Rating TM: 3/3
- Ratios Sharpe / Sortino: 2.256 / 3.7324
- Ratios Sterling / MAR: 0.0000 / 4.3471

Resultados mensuales

<table>
<thead>
<tr>
<th>Año</th>
<th>Ene</th>
<th>Feb</th>
<th>Mar</th>
<th>Abr</th>
<th>Ma</th>
<th>Jun</th>
<th>Jul</th>
<th>Ago</th>
<th>Sept</th>
<th>Oct</th>
<th>Nov</th>
<th>Total</th>
<th>Total %</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>8931 €</td>
<td>-799 €</td>
<td>1665 €</td>
<td>5683 €</td>
<td>6325 €</td>
<td>949 €</td>
<td>2737 €</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>25489 €</td>
<td>51.0%</td>
</tr>
<tr>
<td>2017</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1101 €</td>
<td>1101 €</td>
<td>2.2%</td>
</tr>
</tbody>
</table>
VLP Simulation

Long/Short Mutual Fund using different Google Trends algorithmic trading systems

1. Google Trends Monthly NQ
2. IA 6m Ibex Mood
3. Google Trends Weekly GC
4. Google Trends Monthly ES
5. Google Trends Monthly FDXM
6. Google Trends Weekly FDXM
Thank You

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