NDR
NED DAVIS RESEARCH

Georgia Tech Practicum Kick Off (Spring 2025)

2025-01-09

Kiersten Engel

Agenda

- Overview of Ned Davis Research (NDR)

- Project Summary and Deliverables

- Project Data and Guidelines

- Q&A

About NDR

Ned Davis Research (NDR) is a global **provider of independent investment research, solutions and tools.** Founded in 1980, NDR helps clients around the world make objective investment decisions.

- Team of 30+ strategists and analysts committed to developing, evaluating and monitoring financial markets and NDR proprietary models

- Experienced analysts use fundamental and technical research with models, charts, indicators and weight-of-the-evidence methodology to help clients see the signals and invest with confidence.

- NDR is headquartered in Florida with offices in New York and London
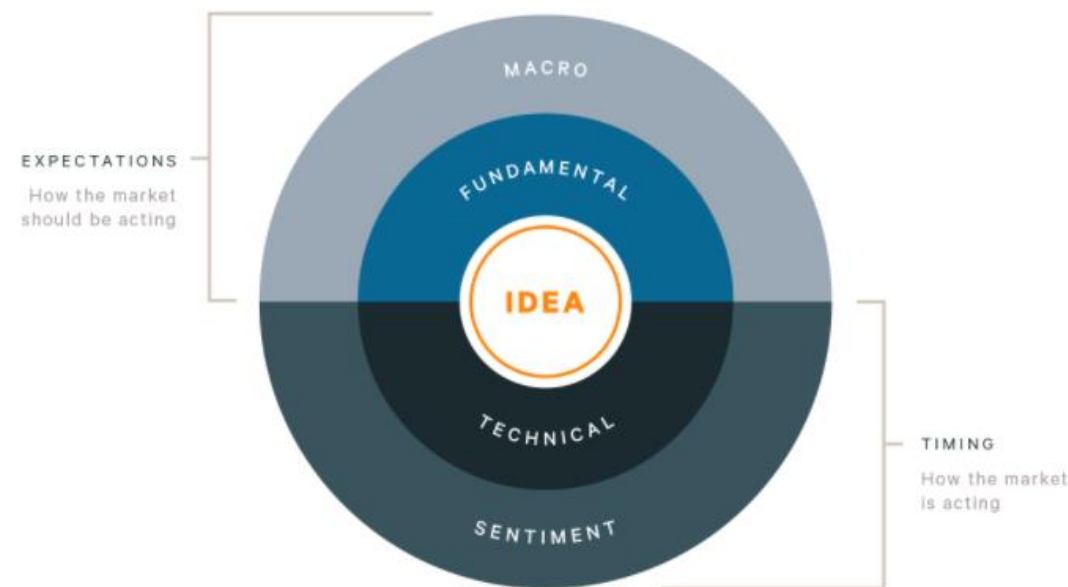
Project Background/Motivation

- Investment sentiment, also known as behavioral finance, is a measure of the attitude and pulse of the human investor. It is often measured using survey data and market measures.

- News articles influence readers and may reflect current market sentiment

- Our objective is to use NLP to identify "high-risk" words (bankrupt, lawsuit, etc.) within news articles and filings that may indicate a company is struggling, and aggregate that across an entire index of companies (like the S&P 500) to see if there is any predictive power.

Date	Count Flags	Title	Desc
2024-04-15	2	Dow Jones Futures Rise As Iran-Israel Fears Ebb; Retail Sales Jump, Tesla Slashes Jobs	Futures rose as Iran-Israel fears ebb. Tesla will **slash** jobs. Goldman earnings beat. Apple iPhone demand woes grow.
2024-04-15	2	Tesla to **lay off** more than 10% of work force	The **cuts** at the electric car manufacturer, led by Elon Musk, are understood to be the equivalent of around 14,000 jobs.
2024-04-15	2	Tesla Cuts 'More Than 10%' Of Global Employees To Prepare For 'Next Phase Of Growth'	Tesla stock fell early Monday as Tesla **cut** its global workforce by more than 10%, the latest sign 2024 is difficult for business.

TSLA — Data 2024-04-11 to 2024-04-22 (Log Scale)

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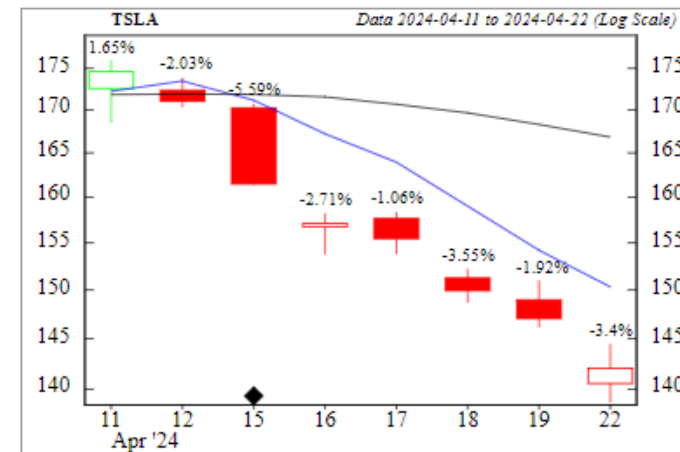
Project Objective

Create aggregate "Risk Score" to identify possible market inflection points using headlines, historical pricing data and SEC filings.

- Historical pricing data can be used to create a labeled dataset that can be used for training/testing

- Keywords and phrases like "bankrupt" or "lawsuit" can be used to identify companies that are likely to experience a drop in price. Negative articles that appear across multiple companies at the same time may indicate an upcoming market drawdown in indices that include those companies.

- Creativity is encouraged! We are flexible about the definition of "Risk Score" and happy to offer suggestions and help explore different options.
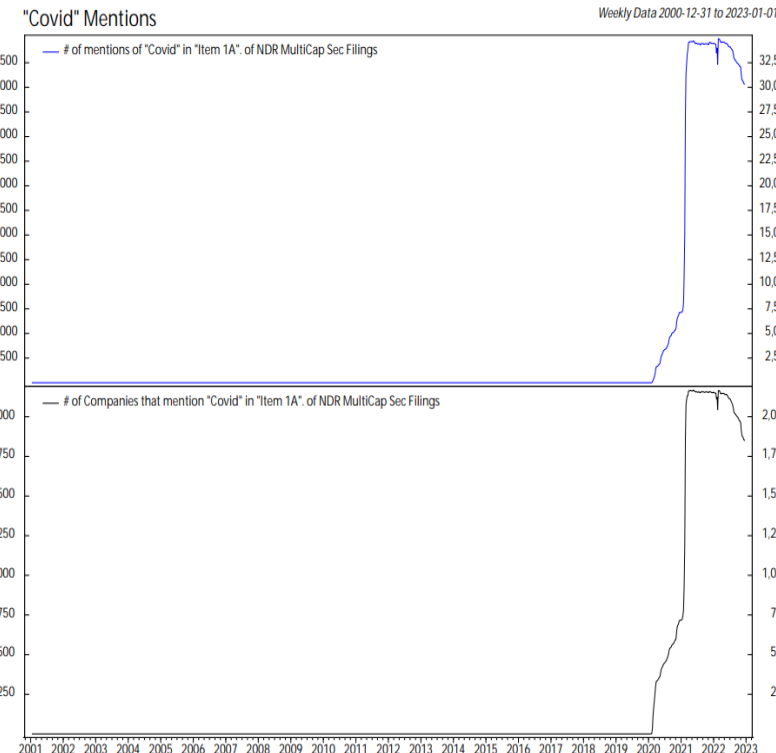
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Examples

The following charts show the number of mentions & number of companies that mention keywords in filings across all NDR Multi-Cap companies over time:
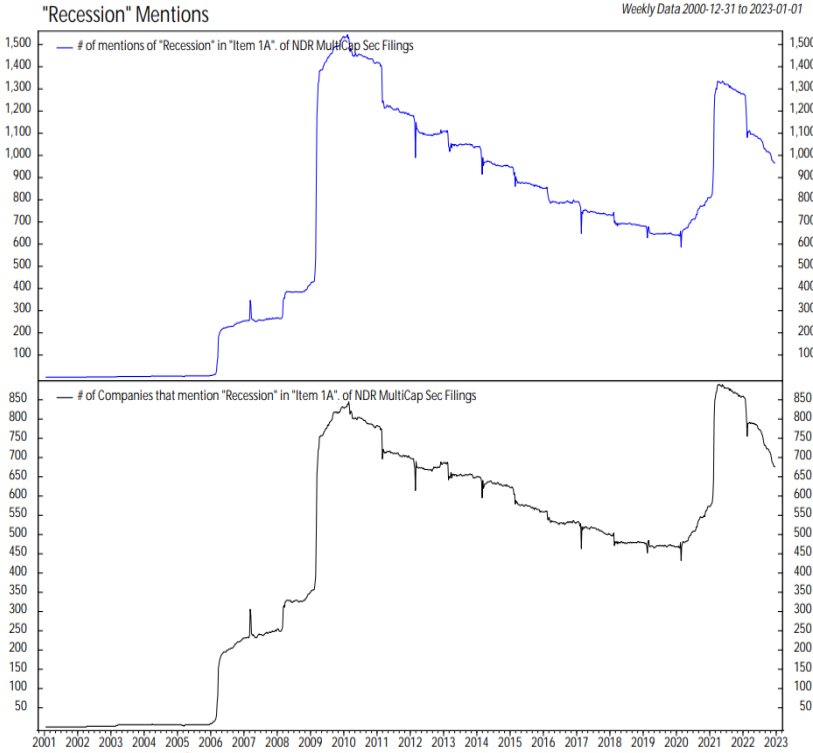
Regex: \bAI\b; Item 1
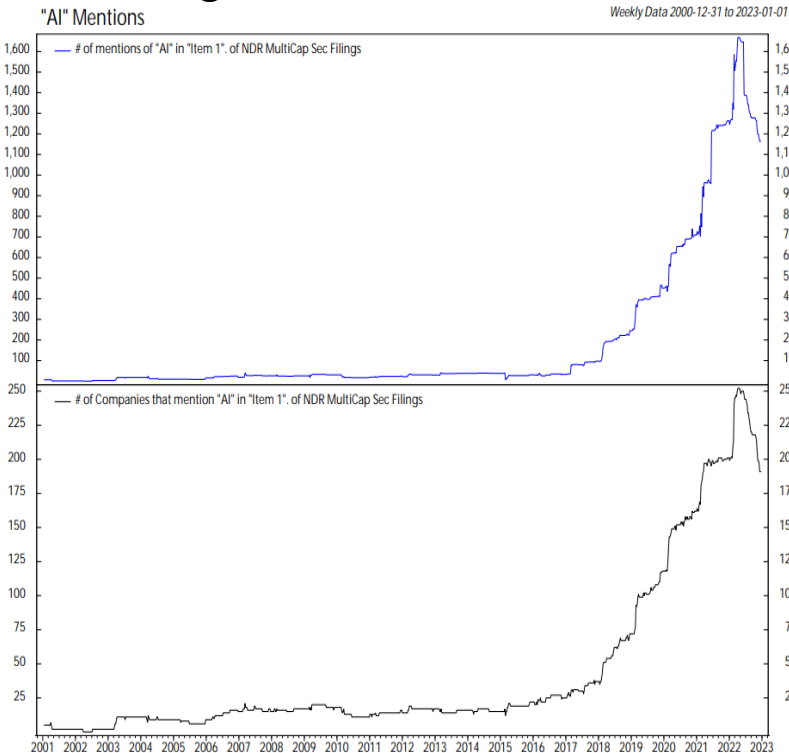
Regex: \b[Cc][Oo][Vv][Ii][Dd]\b; Item 1A

Regex: \b[Rr]ecession\b; Item 1A

Project Deliverables

- **Midterm Report**
  - Due to NDR at 2025-02-20 @2am ET (same as OMSA)
  - Same requirements as OMSA deliverable

- **Final Project Writeup**
  - Due to NDR at 2025-04-09 @2am ET
  - Writeup detailing project findings and methodology (like OMSA Practicum deliverable but including all pertinent details)

- **Code**
  - Due to NDR at 2025-04-15 @11:59pm ET
  - Code used in analysis (does not need to be production quality but would like to be able to reproduce results)
  - Please include a requirements.txt with the versions of packages used

Creativity is encouraged! We are more interested in the methodology and processes used to find themes rather than observing a specific result!

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Project Data

Dataset will contain the following data for roughly 1,000 U.S. companies over the past 20 years:

- Pricing (already adjusted for dividends, splits, corporate actions, etc)
- Trading Volume
- Annual Filings (text data)
- Headlines (text data) (only since 12/2023)
- Unique identifiers for each company to link data points

- Delivered in CSV format for easy processing

- Dataset sourced from top global data providers and should require minimal cleanup

- Additional data available upon request

Note: Data/Code remains property of NDR and must be deleted upon completion of project

SEC Filings 10-K Items 1 and 1A

10-K offers a detailed picture of a company's business, the risks it faces, and the operating and financial results for the fiscal year. Company management also discusses its perspective on the business results and what is driving them.

- **Item 1**

"Business" requires a description of the company's business, including its main products and services, what subsidiaries it owns, and what markets it operates in. This section may also include information about recent events, competition the company faces, regulations that apply to it, labor issues, special operating costs, or seasonal factors. This is a good place to start to understand how the company operates.

- **Item 1A**

"Risk Factors" includes information about the most significant risks that apply to the company or to its securities. Companies generally list the risk factors in order of their importance. In practice, this section focuses on the risks themselves, not how the company addresses those risks. Some risks may be true for the entire economy, some may apply only to the company's industry sector or geographic region, and some may be unique to the company

For more info please see: https://www.sec.gov/files/reada10k.pdf

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SEC Filings 10-K Item 7

- **Item 7**

  "Management's Discussion and Analysis of Financial Condition and Results of Operations" gives the company's perspective on the business results of the past financial year. This section, known as the MD&A for short, allows company management to tell its story in its own words.

  The MD&A presents:

  - The company's operations and financial results, including information about the company's liquidity and capital resources and any known trends or uncertainties that could materially affect the company's results. This section may also discuss management's views of key business risks and what it is doing to address them.

  - Material changes in the company's results compared to the prior period, as well as off-balance sheet arrangements and the company's contractual obligations.

  - Critical accounting judgments, such as estimates and assumptions. These accounting judgments – and any changes from previous years – can have a significant impact on the numbers in the financial statements, such as assets, costs, and net income.

Discussion of Risk in the MD&A

Here are examples of how an MD&A may discuss risks that the company faces.

- A consumer company might discuss ways in which it seeks to meet changing tastes.

- A manufacturing company that relies on natural resources may discuss how it assesses commodity risks and conducts resource management programs.

- A financial institution may discuss ways that management monitors liquidity and assures adequate capital under various scenarios, such as a rise in interest rates or a ratings downgrade.

- A global company may discuss how it handles exchange rate risks.

- Companies may discuss how they handle competition, build their brands, or manage in an economic downturn.

- Companies also may discuss how they ensure compliance with laws and regulations, or how they are addressing the impact of new or anticipated laws and regulations.

For more info please see: https://www.sec.gov/files/reada10k.pdf

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Project Data File Structure

```
SP500/   ## data covers the SP500 and all historical constituents
    sp500_item7_sec_filings_0.txt
    sp500_item1a_sec_filings_0.txt
    sp500_item1_sec_filings_0.txt
    price.csv                ## weekly pricing from 2000 to April 2023
    price_daily.csv          ## daily pricing from 2000 to April 2023
    price_SP500.csv          ## daily pricing of the SP500
    company_info_sp500.txt ## cik|ticker|name|gics

Headlines_Data/  ## Data covers a broader US multi-cap universe
    volume.csv        ## daily volume
    mcap.csv          ## daily market cap
    pricing.csv       ## daily close pricing, includes cap-weighted and ew index
    company_info_news.txt  ## ticker|name|gics
    HEADLINES/
        ticker/
            timestamp.txt   ## xml news feed from this timestamp (millis since
                                Unix Epoch 1/1/1970)
```

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Project Data Details – SEC Filings

Data Files: SEC 10-K Items 1, 1A, and 7 files are pipe delimited text files.

Files contain company name, filing date, link to filing, type of filing, CIK, and Item 1/1A/7 text
**It is possible that some items may be missing from some filings

```
idx = 0
item1_data = pd.read_csv('gaTech_Summer23_Data/SP500/sp500_item1_sec_filings_'+str(idx)+'.txt', delimiter="|")
##item1a_data = pd.read_csv('gaTech_Summer23_Data/SP500/sp500_item1a_sec_filings_'+str(idx)+'.txt', delimiter="|")
##item7_data = pd.read_csv('gaTech_Summer23_Data/SP500/sp500_item7_sec_filings_'+str(idx)+'.txt', delimiter="|")
```

```
display(item1_data)
```

	company	date	link	type	cik	item1
0	3M CO	2022-02-09T15:13:29-05:00	https://www.sec.gov/Archives/edgar/data/66740/...	10-K	66740	Item 1. Business. 3M Company was incorporated...
1	3M CO	2021-02-04T13:53:11-05:00	https://www.sec.gov/Archives/edgar/data/66740/...	10-K	66740	Item 1. Busines s. 3M Company was incorporat...
2	3M CO	2020-02-06T16:16:31-05:00	https://www.sec.gov/ix?doc=/Archives/edgar/dat...	10-K	66740	Item 1. Busines s. 3M Company was incorporat...
3	3M CO	2019-02-07T17:15:37-05:00	https://www.sec.gov/Archives/edgar/data/66740/...	10-K	66740	Item 1. Busines s. 3M Company was incorporat...
4	3M CO	2018-02-08T17:14:52-05:00	https://www.sec.gov/Archives/edgar/data/66740/...	10-K	66740	Item 1. Busines s. 3M Company was incorporat...
...	...	...	...	...	...	...
14991	Zoetis Inc.	2017-02-16T16:26:45-05:00	https://www.sec.gov/Archives/edgar/data/155528...	10-K	1555280	Item 1. Business. Overview Zoetis Inc. is a g...
14992	Zoetis Inc.	2016-02-24T11:32:51-05:00	https://www.sec.gov/Archives/edgar/data/155528...	10-K	1555280	Item 1. Business. Overview Zoetis Inc. is a g...
14993	Zoetis Inc.	2015-02-27T16:52:38-05:00	https://www.sec.gov/Archives/edgar/data/155528...	10-K	1555280	Item 1. Business. Overview Zoetis Inc. is a g...
14994	Zoetis Inc.	2014-03-26T17:15:58-04:00	https://www.sec.gov/Archives/edgar/data/155528...	10-K	1555280	Item 1. Business. Overview Zoetis Inc. is a g...
14995	Zoetis Inc.	2013-03-28T17:23:55-04:00	https://www.sec.gov/Archives/edgar/data/155528...	10-K	1555280	Item 1. Business. Overview Zoetis Inc. is a g...

14996 rows × 6 columns

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Project Data Details

`price.csv` – contains **weekly** pricing data. Columns are Date (weekly dates) and ID's. Each ID corresponds to an "ID" from the text file.

Notes:
- NaN values in cells mean that the company did not exist yet (DON'T FILL!). Recommend using pricing data to determine when company was "active." Note it is possible to be missing some of the text data but should be uncommon that price data series is not contiguous.

```
pricing = pd.read_csv('gaTech_Summer23_Data/MultiCap/price.csv')
display(pricing)
```

	Date	1534701	909832	1341439	851520	1025996	1574540	1378992	1099590	1065837	...	1835591	1758766	1840574	1582313	181018
0	2000-01-07	NaN	46.53125	25.843750	0.781250	21.5000	NaN	NaN	NaN	1.208333	...	NaN	NaN	NaN	NaN	Na
1	2000-01-14	NaN	49.06250	26.703125	0.875000	21.1875	NaN	NaN	NaN	1.104167	...	NaN	NaN	NaN	NaN	Na
2	2000-01-21	NaN	48.50000	29.843750	0.843750	20.8125	NaN	NaN	NaN	1.166667	...	NaN	NaN	NaN	NaN	Na
3	2000-01-28	NaN	46.00000	23.687500	0.875000	19.4375	NaN	NaN	NaN	1.291667	...	NaN	NaN	NaN	NaN	Na
4	2000-02-04	NaN	53.00000	28.906250	0.890625	19.8125	NaN	NaN	NaN	1.500000	...	NaN	NaN	NaN	NaN	Na
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
1209	2023-03-10	101.22	471.14000	84.070000	100.020000	31.3100	14.39	57.62	1168.04	42.980000	...	8.85	7.37	17.08	34.18	5.3
1210	2023-03-17	94.72	487.05000	85.260000	96.040000	28.6800	14.53	54.37	1201.15	44.440000	...	9.48	6.51	16.48	33.59	4.7
1211	2023-03-24	93.73	495.27000	88.010000	92.930000	29.2600	14.37	56.26	1187.28	44.910000	...	9.25	6.37	14.42	35.05	4.6
1212	2023-03-31	101.38	496.87000	92.920000	99.690000	32.4000	14.93	58.90	1318.06	47.520000	...	9.18	5.67	14.42	35.79	4.5
1213	2023-04-06	102.84	485.98000	95.920000	97.680000	32.1300	14.63	57.75	1245.00	46.170000	...	9.16	4.92	13.59	35.14	4.4

1214 rows × 3936 columns

Project Data Details

Headlines:

- XML text file that has each article separated by <item> tags.
- File name is the timestamp in milliseconds since UNIX epoch. It's the time the data was downloaded, not the time of article release (see <pubDate> tag). For this reason, the same article may be in multiple timestamp files.

`HEADLINES/A/1702011600000 >> Fri Dec 08 00:00:00 EST 2023`

Tools/Technologies & Desired Skills

Desired Skills:

- Python preferred (R is acceptable too)
- Basic understanding of NLP and associated packages (spacy, nltk, etc.)
- Market knowledge is great but not required!

Tools/Technologies:

- Python preferred (R is acceptable too)
- No requirements about packages/versions
- Any additional tools may be used at the discretion of the student

Students have the option to self-select teams of up to three.

Note NDR requires that students sign an NDA to work on this project and requires that students disclose their employment if currently employed...

Compliance Requirements

Note NDR requires that students sign an NDA to work on this project.

For compliance reasons, students must be able to make the following affirmations to work on this project:

Employment Questionnaire & Affirmations:

If currently employed, where do you work?

By signing below, I confirm that:

I am NOT currently working for state or local government.

I have NOT contributed to state or local government campaigns or candidates in the past 2 years.

I am NOT on the board of a publicly traded company.

Resources provided by NDR:

- Dataset (and training on working with financial data)

- Weekly office hours and ongoing support with NDR analysts

- Training on financial markets pertinent to project from NDR analysts

- Virtual presentation opportunity for top projects (optional at the discretion of the student)

- Access to NDR research for the fall semester (you should be getting an email about this soon)

Important Information!

NDR **requires that students sign an NDA** to work on this project. NDA **must be signed** <mark>before</mark> **students can access data** or be added to NDR Teams Project discussion group.

All project communication should be sent to Kiersten Engel at **Kiersten.engel@ndr.com** (**NOT** kengel3@gatech.edu)

I cannot respond to NDR-related messages that goes to my @gatech.edu address because it's not archived by NDR compliance. NDR project-related messages that go to my @gatech.edu email will be deleted.

Key Contacts

Kiersten Engel
Research & Development Manager

Kiersten Engel applies quantitative methods to provide clients with a broad scope of analysis, including economic studies, and custom reporting and modeling. Kiersten joined Ned Davis Research Group in 2014.

Kiersten graduated **magna cum laude** from the University of Alabama at Birmingham (UAB) with a Bachelor of Science degree in Applied Mathematics and a minor in Finance. She has also been featured in **UAB Magazine** for her work in mathematics and her career as a ballet dancer with the Alabama Ballet Company.

Kiersten is a **summa cum laude** graduate from the Georgia Institute of Technology (Georgia Tech) with a Master of Science in Analytics focusing on Computational Analytics (machine learning). She continues her research by leading NDR's partnership with Georgia Tech's MS in Analytics Program to sponsor research projects for graduate students. She designs data science projects that apply the latest machine learning techniques to financial markets and serves as an advisor to 50+ graduate students. She also serves as a Head of Teaching Assistant for Georgia Tech's Business Fundamentals for Analytics Masters course.

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See the signals.™

Founded in 1980, Ned Davis Research Group is a leading independent research firm with clients around the globe. With a range of products and services utilizing a 360° methodology, we deliver award-winning solutions to the world's leading investment management companies. Our clients include professionals from global investment firms, banks, insurance companies, mutual funds, hedge funds, pension and endowment funds, and registered investment advisors.
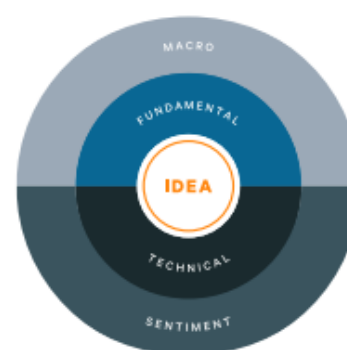
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