OptionsViz

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Background

- Options are contracts that allow traders buy or sell a ***stock*** at a set ***strike*** price before an ***expiration date*** by paying a premium

- Divided into ***Calls*** ***(bullish)*** and ***Puts*** ***(bearish)***

Background

- Options are contracts that allow traders buy or sell a ***stock*** at a set ***strike*** price before an ***expiration date*** by paying a premium

- ***"I think the price of NVDA will rise to $150 by September 1 2025"***

  → *Buy a 150* ***Call*** *option expiring on 09/01/25*

Background

- Options *chains* are tables contain various pieces of information for all contracts across all strikes and expiration dates:
  - Trading prices (premiums)
  - Quotes (current bids and asks)
  - Open Interest (number of contracts available to trade)
  - Volume
  - *and many more!*

CALLS							Strikes: 5		PUTS					
Volume	Open...	AS	BS	Delta	Bid X	Ask X	Exp	Strike	Bid X	Ask X	Volume	Open...	AS	BS	Delta
7 FEB 25 (1) 100 (Weeklys)															64.18% (±3.652)
73,534	24,609	3	49	.68	2.88 P	2.89 U	7 FEB 25	126	.89 D	.90 P	61,512	7,921	20	749	-.32
127,184	57,069	30	107	.59	2.23 W	2.24 P	7 FEB 25	127	1.24 W	1.25 D	48,280	10,077	131	61	-.40
127,359	33,927	325	83	.50	1.67 W	1.68 U	7 FEB 25	128	1.67 W	1.68 P	21,286	5,462	17	128	-.50
70,800	28,947	47	73	.41	1.20 W	1.21 P	7 FEB 25	129	2.20 C	2.22 W	5,937	3,585	21	70	-.59
148,100	192,219	697	29	.32	.83 U	.84 H	7 FEB 25	130	2.42 M	2.85 B	5,245	11,179	51	88	-.69
14 FEB 25 (8) 100 (Weeklys)															53.86% (±8.225)
13,416	10,812	1,153	374	.60	4.80 W	4.95 M	14 FEB 25	126	2.79 B	2.81 H	7,065	2,221	454	108	-.40
17,605	6,943	2,145	3,556	.56	4.30 M	4.40 M	14 FEB 25	127	3.20 M	3.25 M	4,012	2,038	4,206	3,885	-.44
12,558	5,647	1,228	79	.52	3.80 P	3.85 M	14 FEB 25	128	3.65 M	3.70 P	2,689	2,809	57	1,239	-.48
14,118	4,409	1,713	732	.48	3.30 H	3.35 M	14 FEB 25	129	4.15 M	4.25 M	1,420	1,786	2,228	4,219	-.53
52,524	41,012	64	422	.43	2.86 W	2.88 W	14 FEB 25	130	4.70 M	4.80 M	6,470	7,001	2,410	4,094	-.57
21 FEB 25 (15) 100															50.35% (±10.502)
6,159	11,024	271	1,231	.59	5.80 M	5.95 W	21 FEB 25	126	3.70 D	3.75 M	4,440	8,311	4,277	418	-.41
6,527	46,832	3,797	1,860	.56	5.35 M	5.40 M	21 FEB 25	127	4.10 M	4.20 M	3,055	9,286	4,470	4,368	-.44
7,733	8,552	3,817	1,190	.52	4.80 M	4.90 M	21 FEB 25	128	4.60 M	4.65 M	2,968	10,991	4,039	2,179	-.48
2,200	6,903	4,379	4,091	.49	4.30 M	4.40 M	21 FEB 25	129	5.10 M	5.15 U	650	10,703	59	3,939	-.51
39,689	159,245	1,512	6	.46	3.90 X	3.95 M	21 FEB 25	130	5.65 M	5.70 H	2,170	48,988	439	435	-.54
28 FEB 25 (22) 100 (Weeklys)															67.98% (±17.249)
2,196	4,923	1	1,037	.58	9.40 M	9.45 N	28 FEB 25	126	7.05 M	7.10 H	762	1,499	1	1,031	-.42
4,630	7,822	3,734	4,210	.56	8.85 M	9.00 M	28 FEB 25	127	7.55 T	7.65 M	238	2,780	4,029	121	-.44
1,759	5,223	2,792	699	.54	8.40 M	8.50 M	28 FEB 25	128	8.05 H	8.15 M	337	8,115	4,112	224	-.46
540	3,071	1,489	4,299	.52	7.90 M	8.00 M	28 FEB 25	129	8.55 M	8.65 M	127	4,309	1,733	3,015	-.48
10,918	28,190	2,721	3,215	.50	7.45 M	7.55 M	28 FEB 25	130	9.10 M	9.20 M	605	17,941	2,491	2,827	-.50
7 MAR 25 (29) 100 (Weeklys)															64.76% (±18.887)
939	1,384	855	1,578	.58	10.20 M	10.30 M	7 MAR 25	126	7.75 M	7.85 M	76	944	1,519	1,756	-.42
1,043	1,599	320	1,834	.56	9.70 M	9.80 M	7 MAR 25	127	8.25 M	8.35 M	215	271	1,949	1,501	-.44
323	661	3,125	2,914	.54	9.20 M	9.35 M	7 MAR 25	128	8.75 M	8.85 M	38	432	1,632	2,222	-.46
401	687	2,745	1,212	.52	8.75 M	8.85 M	7 MAR 25	129	9.30 M	9.40 M	48	198	3,908	183	-.48
2,088	15,026	1	786	.51	8.30 M	8.35 Z	7 MAR 25	130	9.80 M	9.95 M	185	1,035	3,968	3,613	-.49
14 MAR 25 (36) 100 (Weeklys)															62.07% (±20.179)
849	227	586	231	.58	10.85 M	10.95 E	14 MAR 25	126	8.25 M	8.40 M	278	38	3,372	3,718	-.42
655	508	644	30	.56	10.35 B	10.45 M	14 MAR 25	127	8.75 M	8.90 M	65	9	3,506	3,606	-.44
568	262	2,188	712	.55	9.85 M	9.95 M	14 MAR 25	128	9.30 M	9.40 M	21	36	2,419	729	-.46
254	100	2,805	2,867	.53	9.35 M	9.50 M	14 MAR 25	129	9.80 M	9.90 M	9	45	415	3,120	-.47
770	1,989	743	2,961	.51	8.90 M	9.00 M	14 MAR 25	130	10.40 N	10.45 M	67	91	500	1	-.49
21 MAR 25 (43) 100															62.63% (±22.31)
6,228	100,522	155	965	.60	12.35 M	12.45 H	21 MAR 25	125	8.70 M	8.80 M	1,940	42,392	1,907	2,349	-.41
1,891	77,685	675	547	.58	11.85 M	11.95 M	21 MAR 25	126	9.20 M	9.30 M	1,087	13,092	2,199	681	-.42
1,649	9,201	1,336	1,411	.55	10.85 M	10.95 M	21 MAR 25	128	10.30 M	10.40 M	733	8,469	3,463	3,561	-.45

Background

- Chains are difficult to interpret and understand trends
- Opportunity to use modern visualization and LLM tools to gain better insight
- We created a webapp called *OptionsViz* that ingests options chain data to:
  - create meaningful visualizations
  - assess the risk-reward tradeoff for strategies
  - query LLMs to identify market trends and sentiment from news articles

Data

- **Yahoo Finance:** End-of-Day (EOD) options chains

TradingView

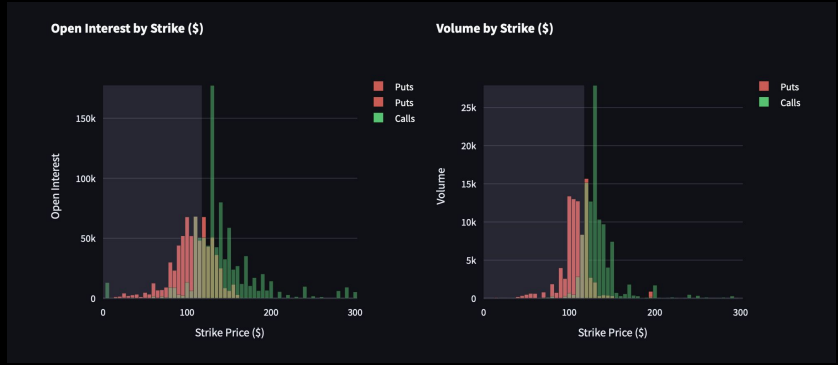
- **TradingView:** Real-time and historical price data

News API

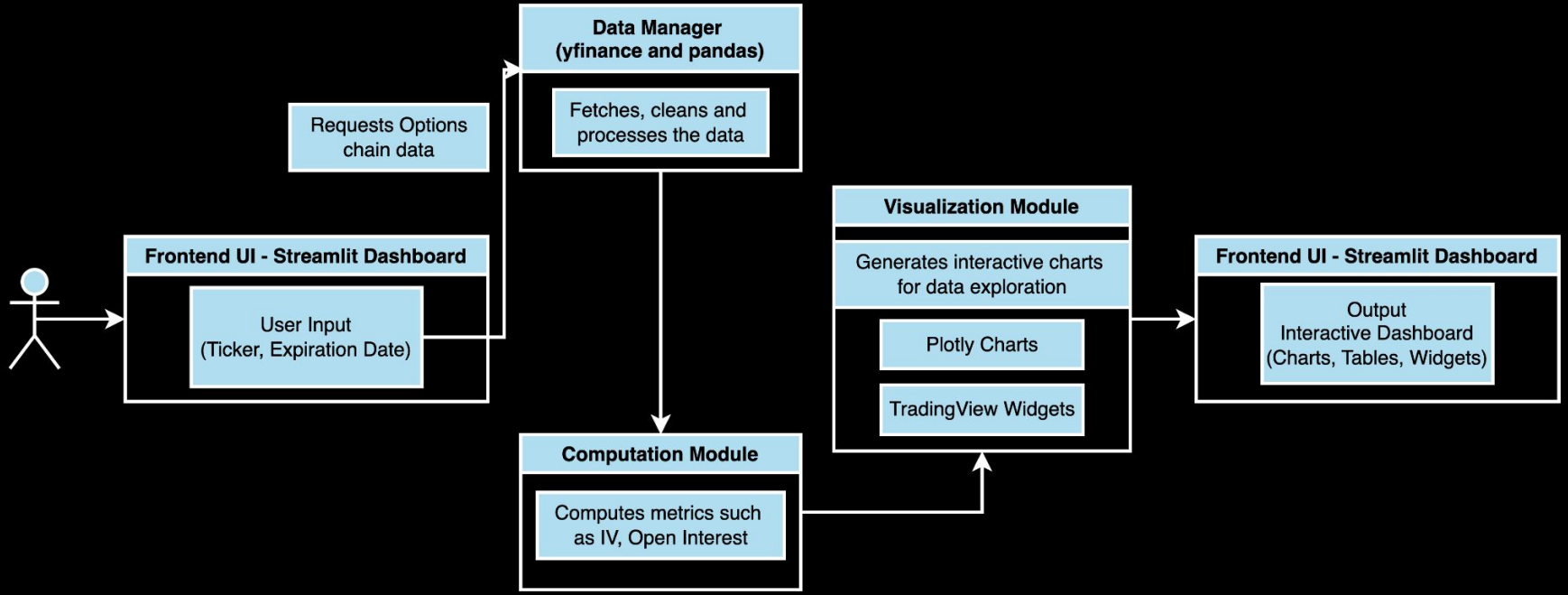
- **NewsAPI**: real-time news feed for LLMs

Use cases

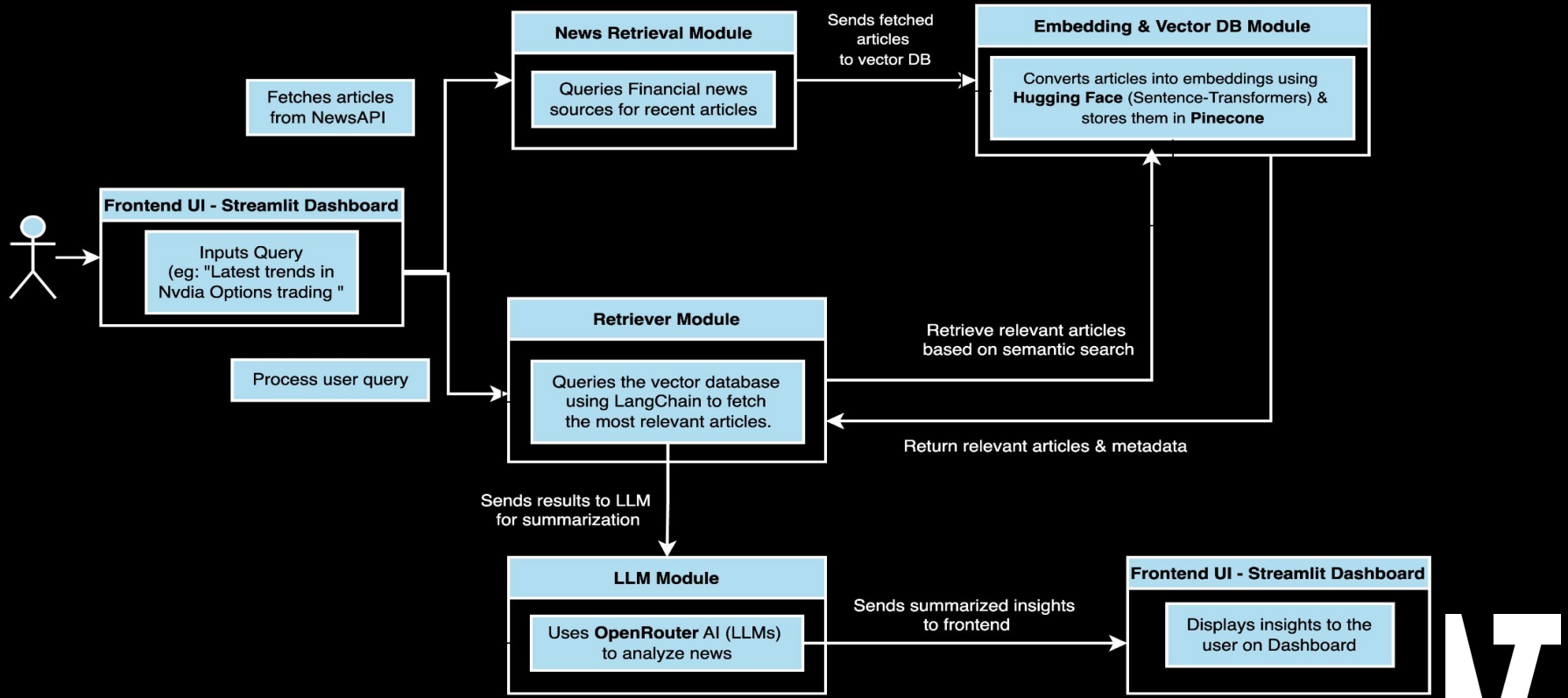
- Retail trader
- Risk-reward assessment
  - visualize options strategies and current market trends



Design


Data Manager
(yfinance and pandas)
Fetches, cleans and processes the data
Requests Options chain data
Frontend UI - Streamlit Dashboard
User Input
(Ticker, Expiration Date)
Visualization Module
Generates interactive charts for data exploration
Plotly Charts
TradingView Widgets
Frontend UI - Streamlit Dashboard
Output
Interactive Dashboard
(Charts, Tables, Widgets)
Computation Module
Computes metrics such as IV, Open Interest

Design


News Retrieval Module
Queries Financial news sources for recent articles
Sends fetched articles to vector DB
Embedding & Vector DB Module
Converts articles into embeddings using Hugging Face (Sentence-Transformers) & stores them in Pinecone
Fetches articles from NewsAPI
Frontend UI - Streamlit Dashboard
Inputs Query (eg: "Latest trends in Nvdia Options trading "
Retriever Module
Queries the vector database using LangChain to fetch the most relevant articles.
Process user query
Retrieve relevant articles based on semantic search
Return relevant articles & metadata
Sends results to LLM for summarization
LLM Module
Uses OpenRouter AI (LLMs) to analyze news
Sends summarized insights to frontend
Frontend UI - Streamlit Dashboard
Displays insights to the user on Dashboard

Demo

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Lessons learned and future work

Lessons:

- **Streamlit functionality**
- **CI/CD testing through GitHub**

Future:

- **Integrate historical data for more robust analysis**

backup

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Background

- **Options are contracts that allow traders buy or sell a *stock* at a set *strike* price before an *expiration date* by paying a *premium***
  - ***"I think the price of NVDA will fall to $90 by July 18 2025"***

    → Buy a 90 ***Put*** option expiring on 07/18/25