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Automating Equity Chart Analytics

Using Snowflake Cortex AI COMPLETE to Read, Analyze, and Share Investment Insights

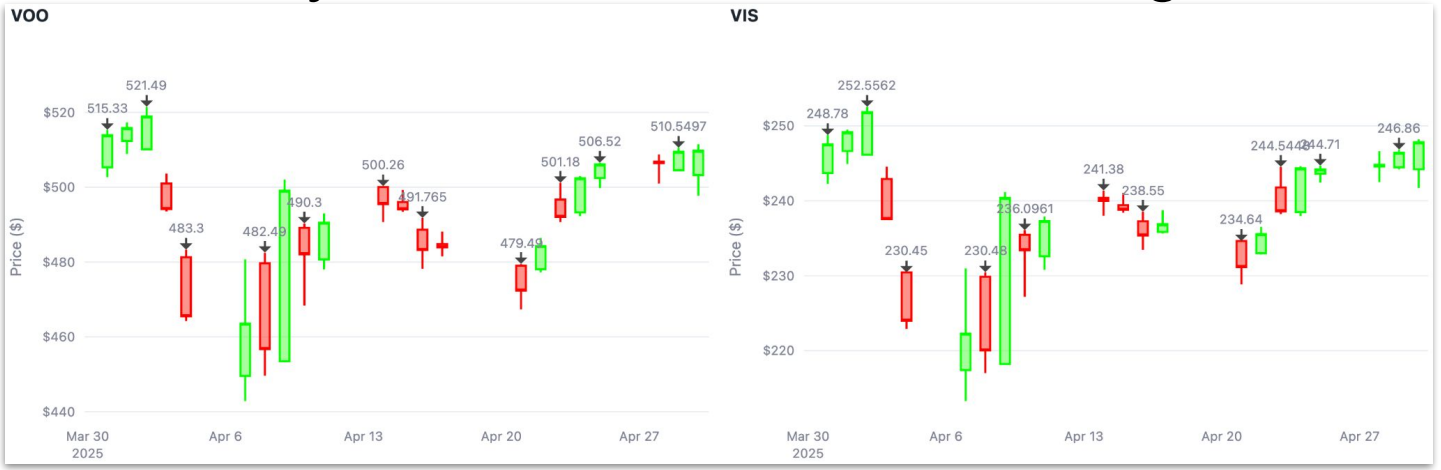
The Challenges of Manual Chart Reading

- ⏳ **Time Drain**
  - Deciphering price action across multiple asset classes eats up valuable time.
- 🤯 **Analysis Overload**
  - Jumping between dozens of charts makes it tough to retain insights and spot broader trends.
  - It's easy to analyze one and forget the nuances of the last!
- ✍️ **Note-Taking Hurdles**
  - Capturing key learnings and investment takeaways often falls by the wayside.
- 🤝 **Sharing Limitations**
  - Explaining chart patterns and analysis to others can be cumbersome without a clear, concise summary.

The Solution - Snowflake Cortex LLM Function

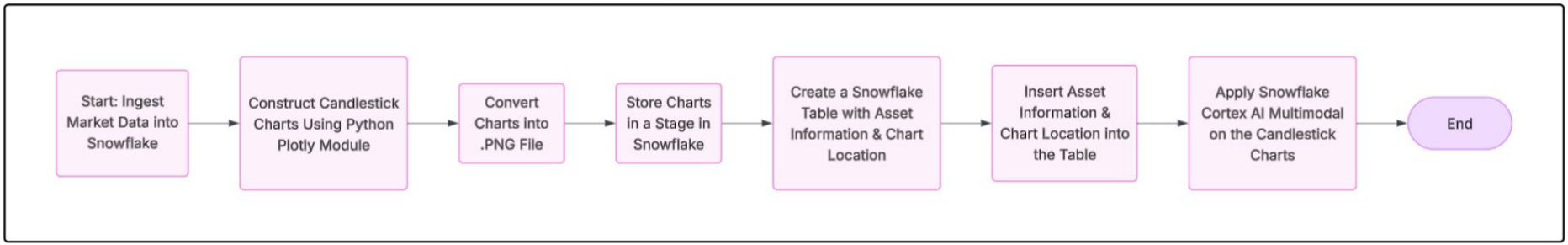
- Snowflake Cortex COMPLETE Multimodal
- A general-purpose function capable of performing a wide range of user-specified text and vision processing tasks.
- Use COMPLETE for
  - Comparing images
  - Captioning images
  - Classifying images
  - Extracting entities from images
  - Answering questions using data in graphs and charts

Use Case: Analyze Candlestick Charts Using COMPLETE

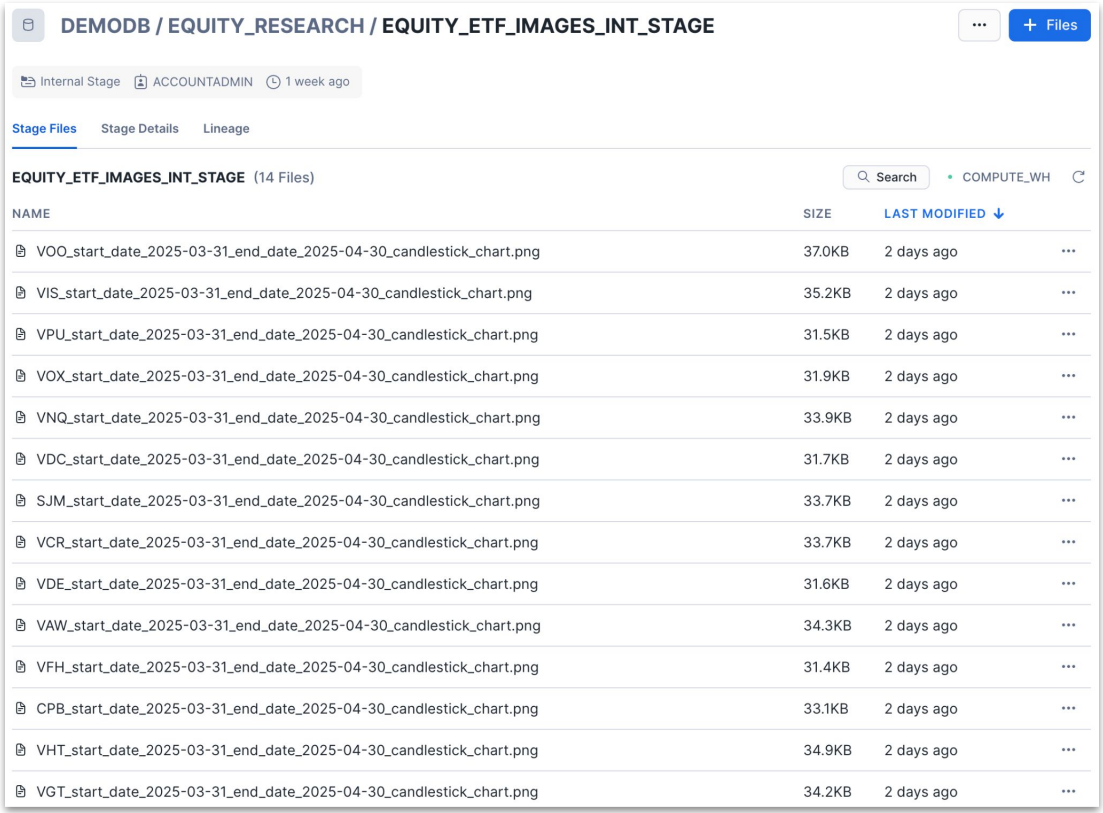


The Process

- Ingest Market Data into Snowflake
- Construct Candlestick Charts Using Python Plotly Module
- Convert Charts into .PNG File
- Store Charts in a Stage in Snowflake
- Create A Snowflake Table with Asset Information & Chart Location
- Insert Asset Information & Chart Location into the Table
- Apply Snowflake Cortex AI Multimodal

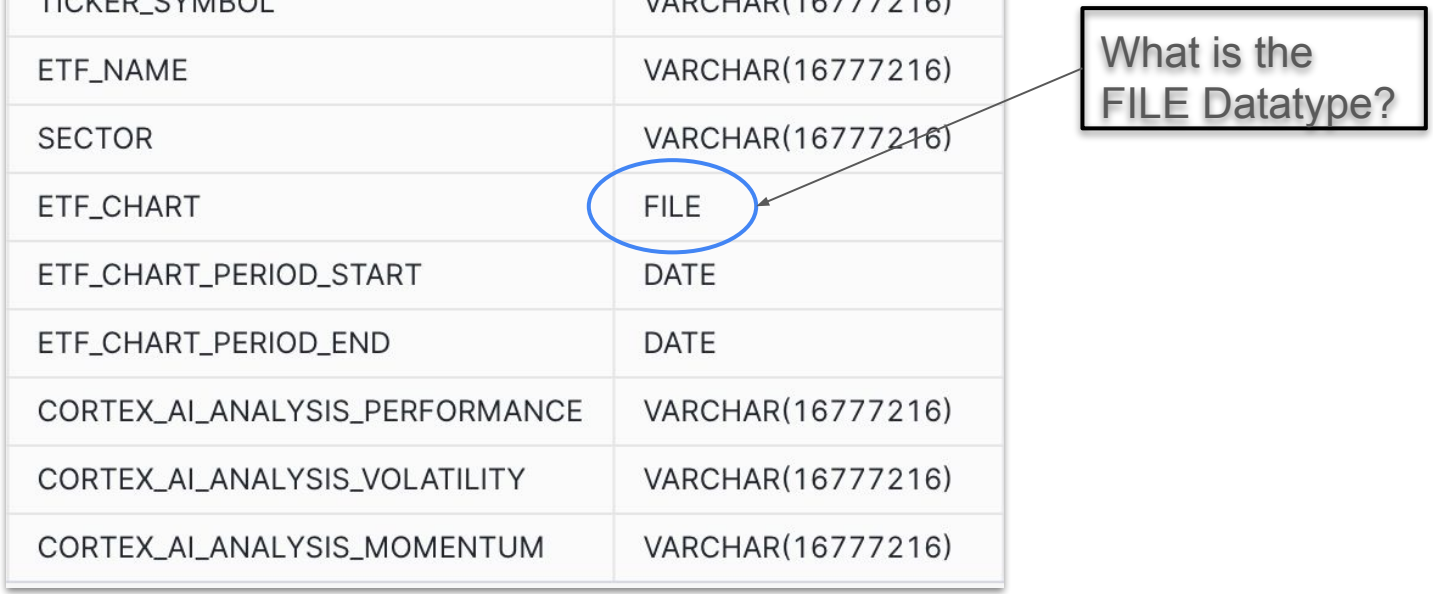


The Snowflake Stage



The Snowflake Table

name	type
TICKER_SYMBOL	VARCHAR(16777216)
ETF_NAME	VARCHAR(16777216)
SECTOR	VARCHAR(16777216)
ETF_CHART	FILE
ETF_CHART_PERIOD_START	DATE
ETF_CHART_PERIOD_END	DATE
CORTEX_AI_ANALYSIS_PERFORMANCE	VARCHAR(16777216)
CORTEX_AI_ANALYSIS_VOLATILITY	VARCHAR(16777216)
CORTEX_AI_ANALYSIS_MOMENTUM	VARCHAR(16777216)



The FILE Datatype

- Snowflake provides the FILE data type for unstructured data.
- A FILE value represents a file stored in an internal or external stage
- Does not store the file's data, only a reference to it.
- It includes the following metadata:
  - STAGE: The name of the stage on which the file resides.
  - RELATIVE_PATH: The relative path of the file in its stage.
  - STAGE_FILE_URL: The stage file URL.
  - SCOPED_FILE_URL: A scoped file URL.
  - CONTENT_TYPE: The MIME type of the file.
  - SIZE: The size, in bytes, of the file.
  - ETAG: A unique hash of the file contents.
  - LAST_MODIFIED: The timestamp at which the file was last modified.
- Not all of these fields are required.

The INSERT Statement

```
INSERT INTO EQUITY_ETF_IMAGES_TBL
SELECT
    'VOO',
    'Vanguard S&P 500 Index ETF',
    'LARGE BLEND',
    TO_FILE(BUILD_STAGE_FILE_URL('@EQUITY_ETF_IMAGES_INT_STAGE',
'VOO_start_date_2025-03-31_end_date_2025-04-30_candlestick_chart.png')),
    '2025-03-31',
    '2025-04-30',
    'TEXT',
    'TEXT',
    'TEXT';
```

The AI Specifics

AI Specific Details	Value
Snowflake Cortex AI LLM Function	COMPLETE Multimodal
Large Language Model	Anthropic Claude 3.5 Sonnet
Prompt For Equity Performance	Analyze the monthly performance of the ETF. In 5 bullet points or less, compare the ETF\'s price or return at the beginning of the month to its price or return at the end of the month.
Prompt For Equity Volatility	Describe the volatility of the ETF in 5 bullet points or less. Compare the level and characteristics of volatility observed during the first five trading days of the month versus the last five trading days. Describe if one period was significantly more or less volatile than the other, and note any distinct patterns or events that may have contributed to these differences.
Prompt For Equity Momentum	Analyze the momentum of the ETF over the past [Specify Time frame, e.g., month, quarter, year]. Describe the current trend (uptrend, downtrend, sideways) and the strength of this momentum. Are there any signs of accelerating or decelerating momentum?

The COMPLETE Multimodal LLM Function Call

```
SELECT SNOWFLAKE.CORTEX.COMPLETE('claude-3-5-sonnet',
'Analyze the monthly performance of the ETF. In 5 bullet points or less, compare the ETF\'s price or
return at the beginning of the month to its price or return at the end of the month.',
       TO_FILE(ETF_CHART)) month_perf,
                TICKER_SYMBOL
FROM
       EQUITY_ETF_IMAGES_TBL
WHERE
       EQUITY_ETF_IMAGES_TBL.TICKER_SYMBOL = 'VOO'
```

Update the Table with Cortex AI Analysis

```
UPDATE
    EQUITY_ETF_IMAGES_TBL
SET
    CORTEX_AI_ANALYSIS_MOMENTUM = b.month_momentum
FROM
        (
            SELECT SNOWFLAKE.CORTEX.COMPLETE('claude-3-5-sonnet',
                    'Analyze the momentum of the ETF over the past [Specify Timeframe, e.g., month,
quarter, year]. Describe the current trend (uptrend, downtrend, sideways) and the strength of this
momentum. Are there any signs of accelerating or decelerating momentum?',
                        TO_FILE(ETF_CHART)
                ) month_momentum,
                TICKER_SYMBOL
            FROM
                EQUITY_ETF_IMAGES_TBL
            WHERE
                EQUITY_ETF_IMAGES_TBL.TICKER_SYMBOL = 'VGT'
        ) b
WHERE
    EQUITY_ETF_IMAGES_TBL.TICKER_SYMBOL = B.TICKER_SYMBOL;
```

Examples

Momentum of $VIS ETF Analyzed By Cortex AI COMPLETE

Momentum: Based on the candlestick chart shown for the VIS ETF over approximately one month (March 30 - April 27, 2025), I can provide the following momentum analysis:

Current Trend and Pattern:

- The ETF is showing an overall upward trend, particularly in the most recent periods
- There was significant volatility in early April with a notable dip followed by recovery
- The current price level (246.86) is near the period high of 248.78

Momentum Characteristics:

1. Early Period: Started strong around $248, followed by a sharp decline
2. Mid-Period: Showed consolidation and recovery from the low of around $215
3. Recent Period: Demonstrating strong positive momentum with consistent green candles

Signs of Momentum Change:

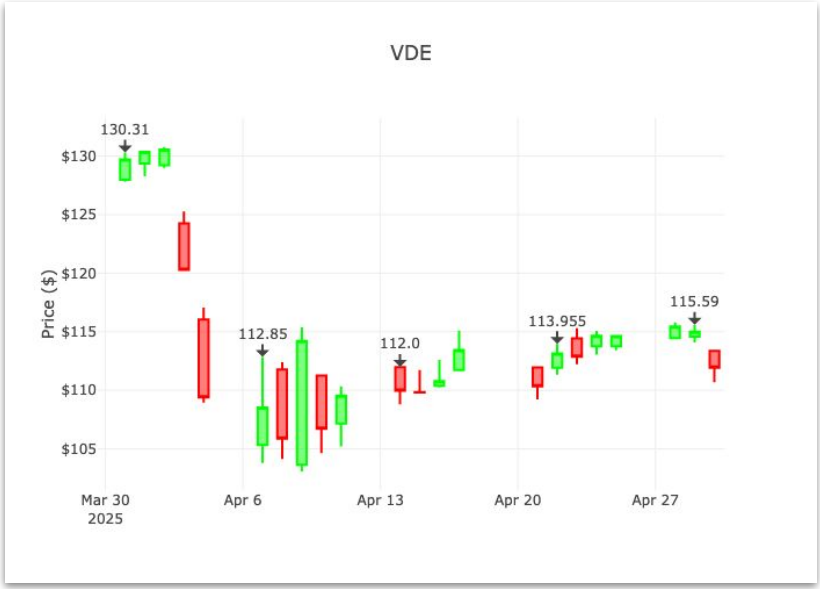
- The recent candlesticks show bullish momentum with higher lows and higher highs
- The size of the green candles in the latest trading sessions suggests accelerating upward momentum
- Volume appears to be supporting the upward move (based on candle size)

Current Momentum Status:

- Strong upward momentum
- No immediate signs of deceleration
- Price action suggests continued bullish sentiment

The ETF appears to have recovered well from its early April decline and is showing strong positive momentum heading into May.

Volatility of $VDE ETF Analyzed By Cortex AI COMPLETE



Volatility: Here's an analysis of the VDE ETF's volatility in 5 bullet points:

• First five trading days (early April): Showed significantly higher volatility with large price swings, including a notable drop from around $130 to the 105-$115 range, marked by longer candlesticks indicating substantial intraday price movements.

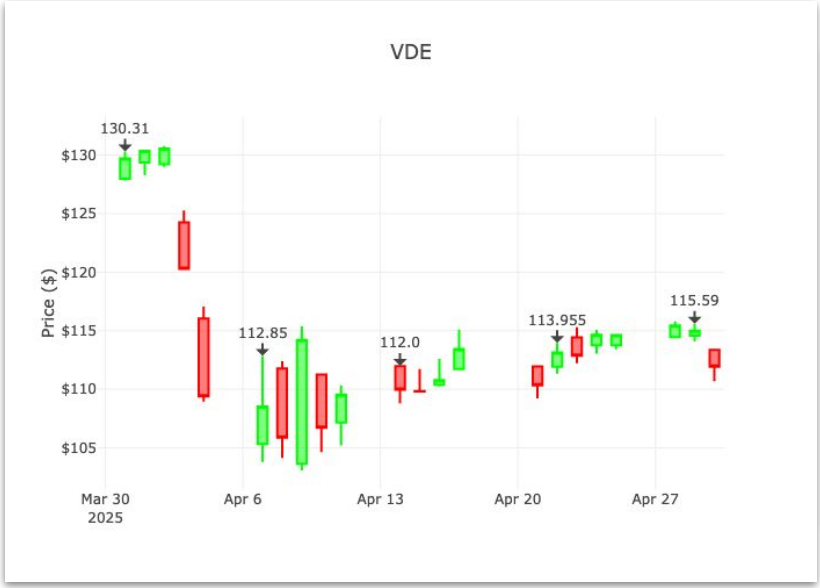
• Last five trading days (late April): Demonstrated relatively lower volatility with smaller candlesticks and more stable price action around the $115 level, though there was a modest pullback at the very end of the period.

• Pattern comparison: The early-month period showed a clear downward trend with high volatility, while the late-month period displayed a more consolidative pattern with an upward bias and lower volatility.

• Notable events: A major sell-off appears to have occurred in the first week of April, causing the most volatile price action of the month, with prices stabilizing and gradually recovering in subsequent weeks.

• Overall volatility trend: The data suggests a clear transition from high volatility in the beginning of the month to lower volatility in the latter part, with the average daily price range decreasing significantly from early to late April.]

Performance of $VDE ETF Analyzed By Cortex AI COMPLETE



Performance: Based on the VDE ETF price chart shown, here's a monthly performance analysis:

• Starting Point (March 30, 2025): The ETF opened at approximately $130.31

• End Point (April 27, 2025): The ETF closed at approximately $112-113

• Overall Monthly Trend: The ETF showed a significant downward trend over the period

• Major Price Drop: There was a substantial decline in early April, dropping from $130 + toaround$ 112.85

• Volatility Pattern: After the initial drop, the price stabilized and traded sideways between $110—115$ for most of April, with smaller fluctuations

This represents roughly a 13-14% decline over the one-month period.]

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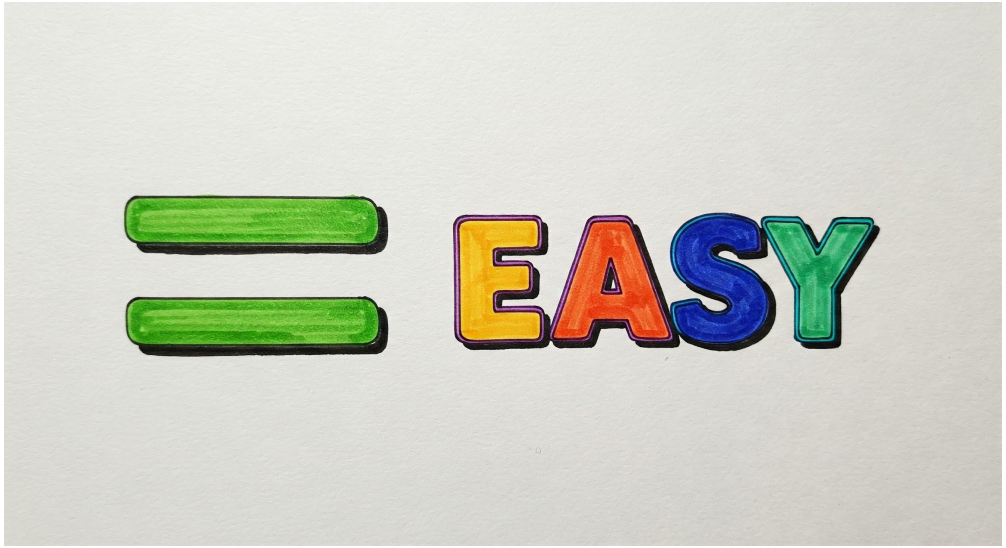

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