



Hybrid LLM System for Economic Sentiment Analysis and Investment Strategy

Adviser: Dr. Jirayu Petchhan

Introduction



Problem Statement

In today's digital economy, financial markets are driven by rapid news cycles, creating significant barriers for human analysts

- **Information Overload:** Thousands of financial news articles are published daily, far exceeding human processing capacity.
- **Velocity & Latency:** Markets react instantly. Traditional analysis is too slow, leading to lagging decisions.
- **Human Bias:** Manual interpretation is inconsistent, prone to fatigue, and influenced by personal emotions.

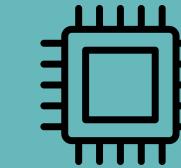


Project Objective



Automated Pipeline

Develop a fully automated system for news collection and analysis to eliminate manual workload and reduce information latency.



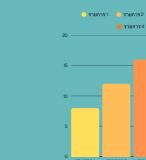
Hybrid Intelligence

Integrate statistical methods (TF-IDF) for speed with Large Language Models (LLMs) for deep, context-aware sentiment analysis.



Consensus Scoring

Establish a standard for confidence by using a multi-model voting mechanism to minimize individual model bias.



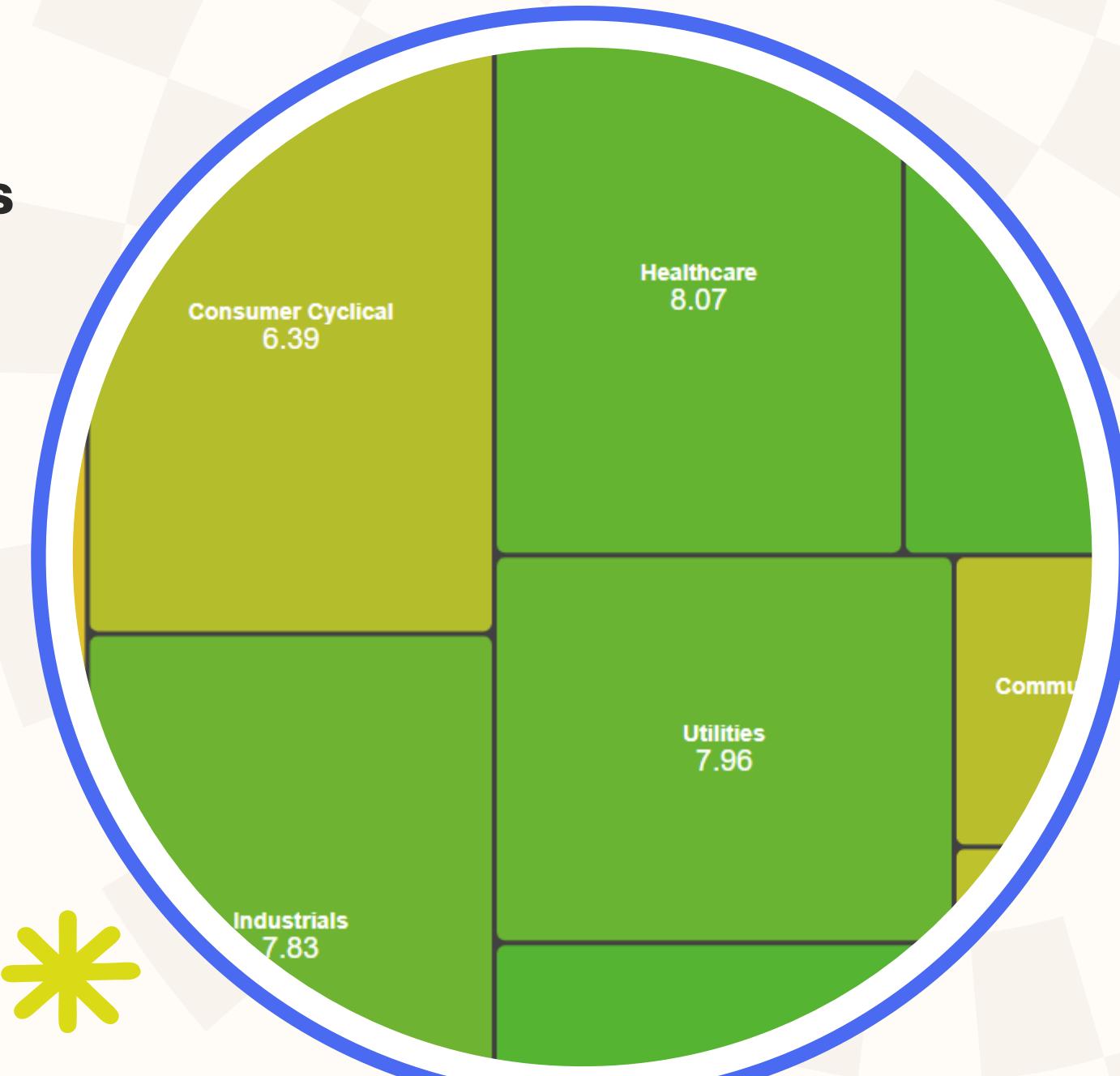
Visual Insights

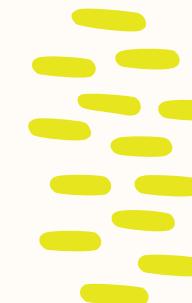
Create an intuitive Dashboard with Market Heatmaps that allows investors to see the "Big Picture" and drill down into details instantly.

MarketMind

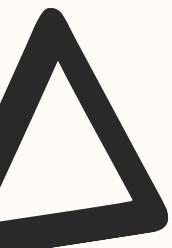
Sector-Specific Investment Analysis via Multi-Model Consensus

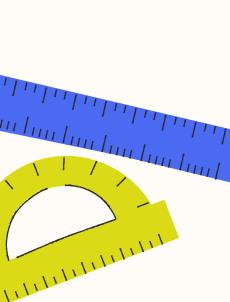
- **The Solution :** Utilizes a Multi-Model Consensus approach (3 LLMs) to cross-verify data, eliminate bias, and deliver higher accuracy than single-model systems.
- **Key Features**
 - **Sector-Specific Analysis :** Granular insights for each industry.
 - **Market Scoring :** Real-time sentiment analysis and market direction scoring.
 - **AI Investing :** Actionable Buy/Hold/Sell recommendations with diverse reasoning from multiple AI agents.



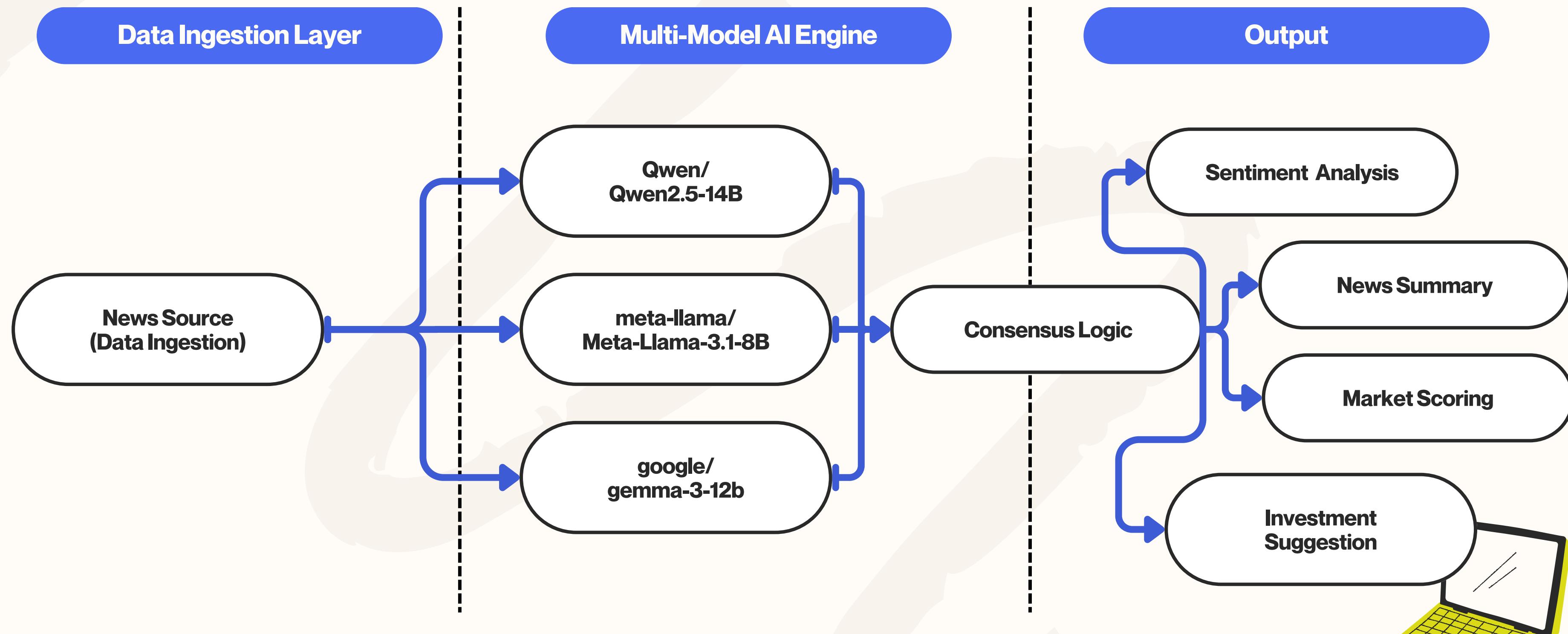


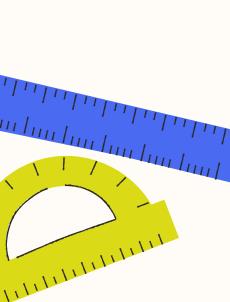
Solution



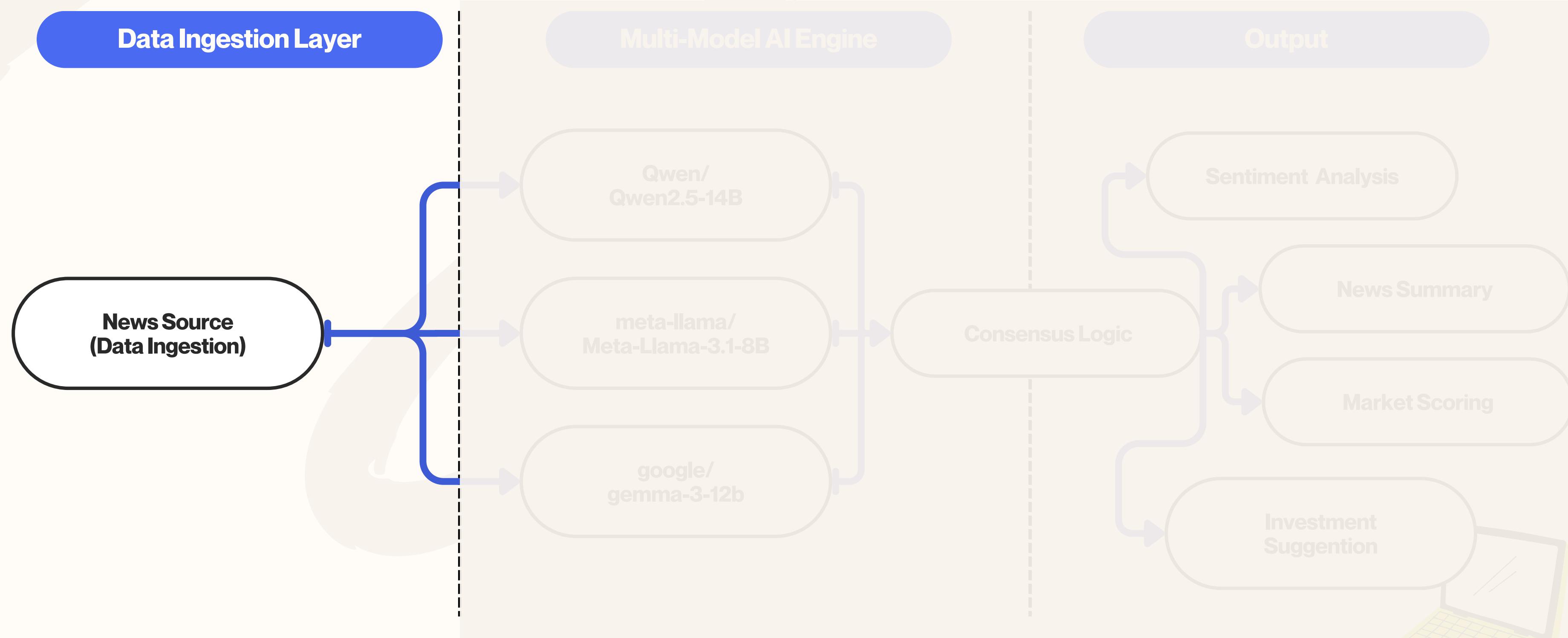


How the solution works

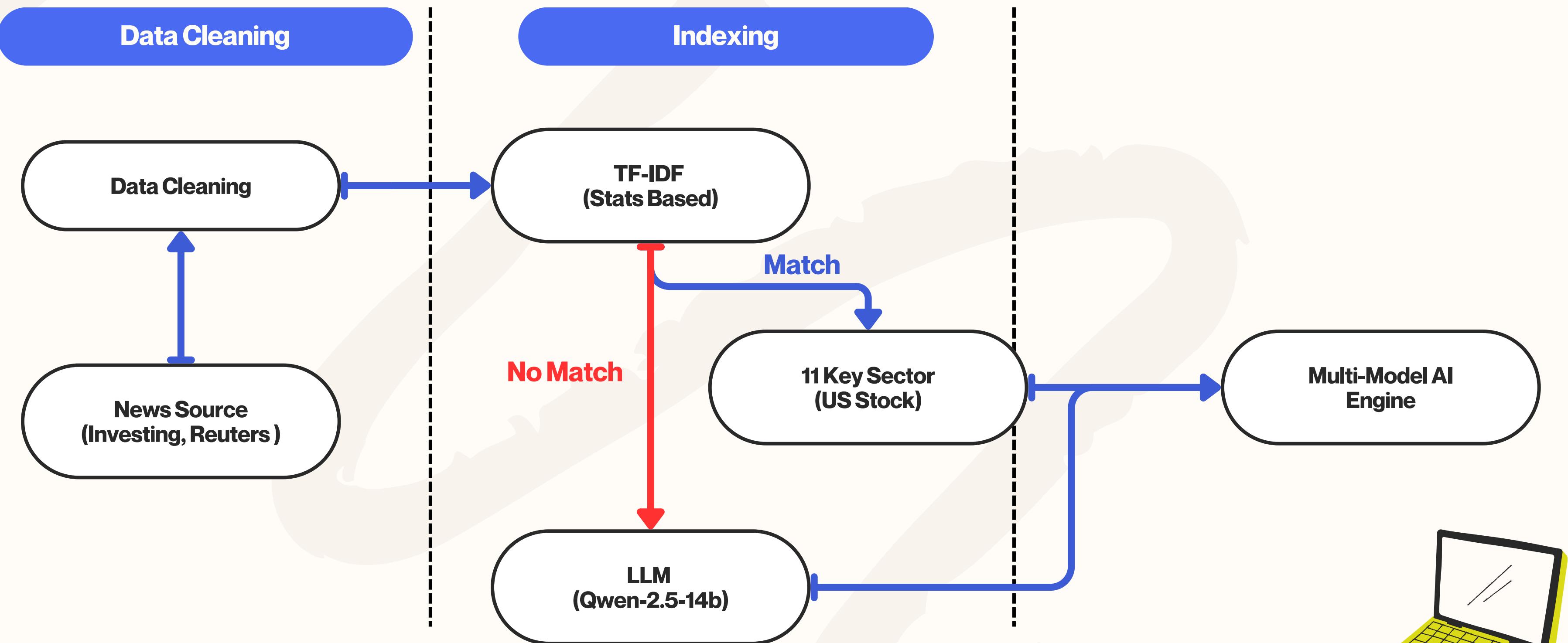




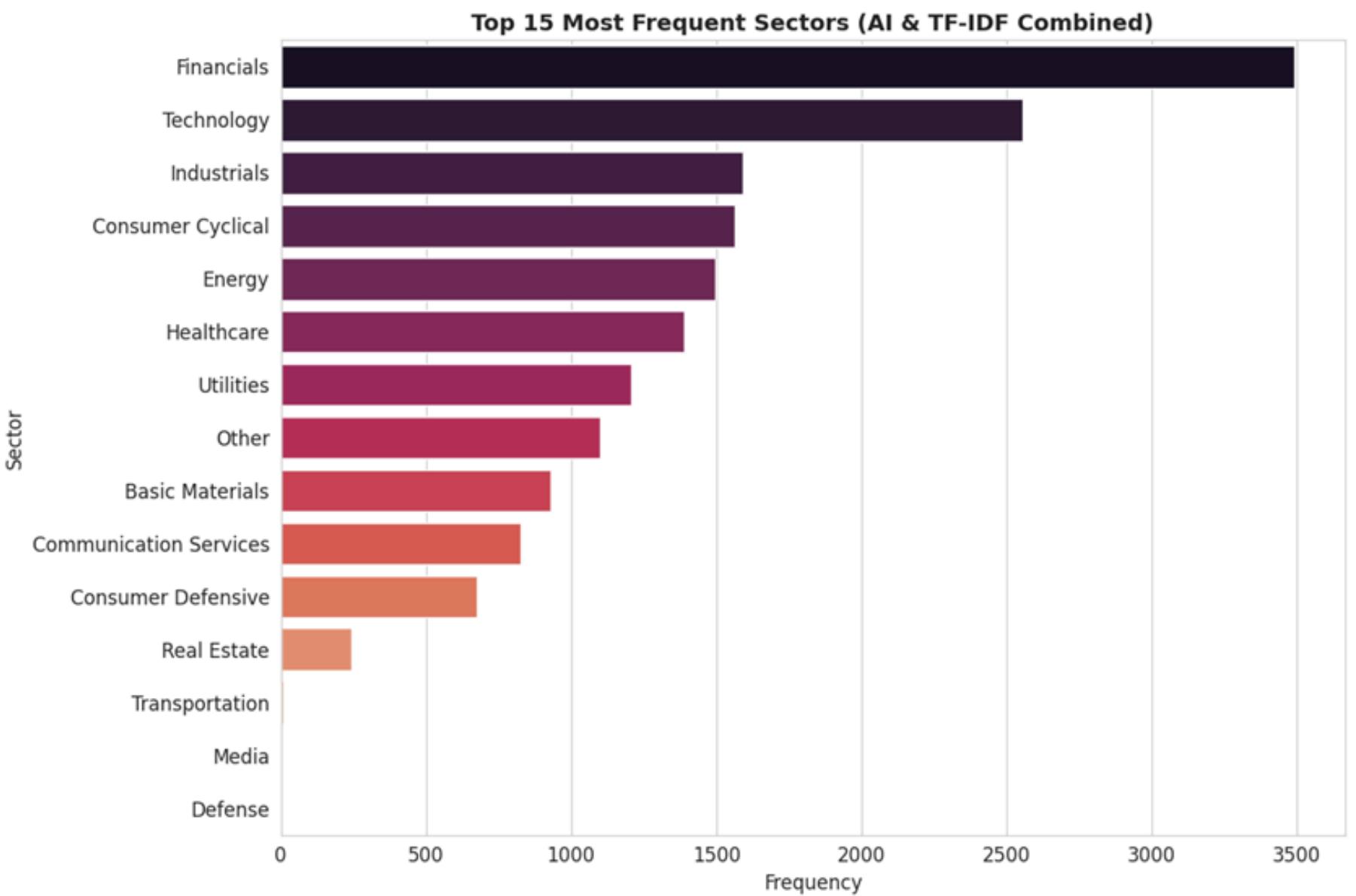
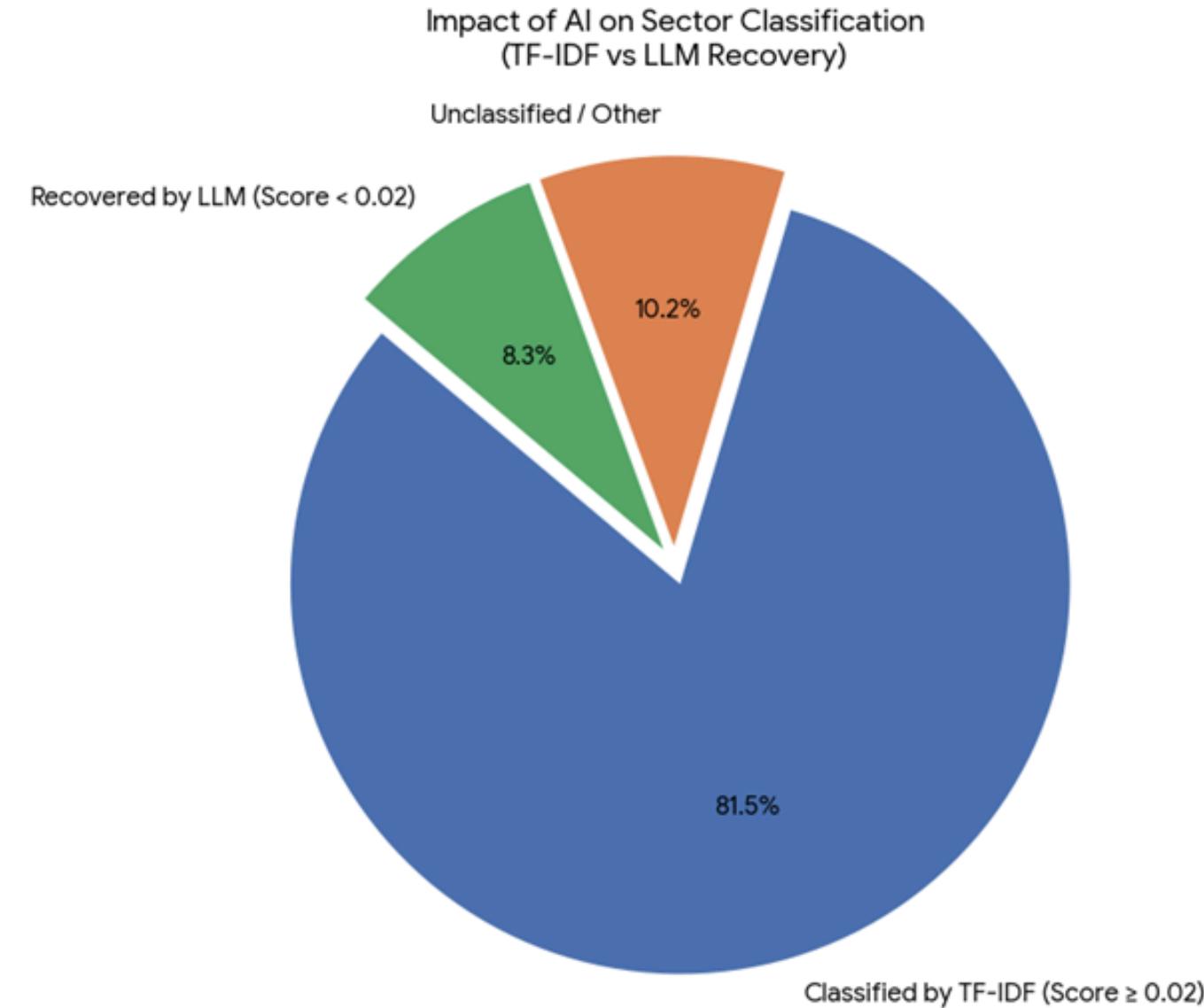
How the solution works



Data Ingestion Layer

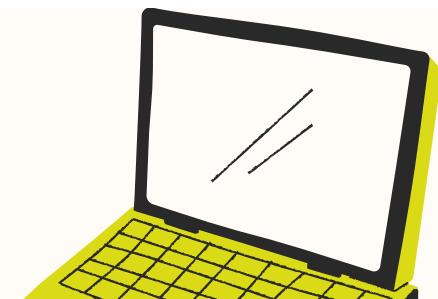


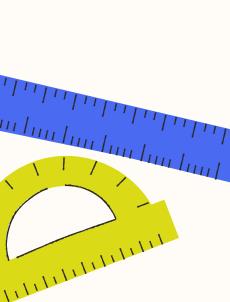
Data Ingestion Layer



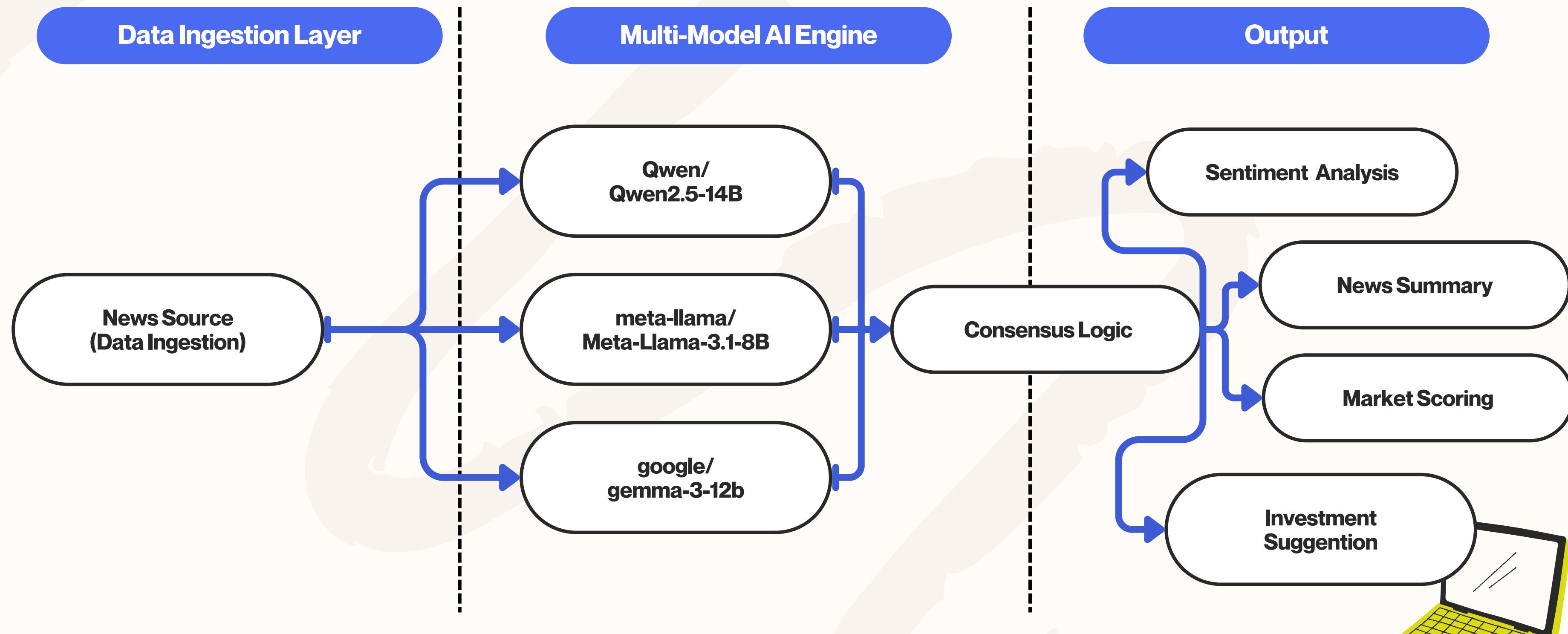
▲ Impact of AI on Sector Classification

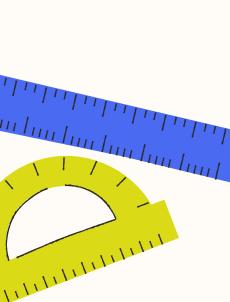
▲ Top 15 Most Frequent Sectors



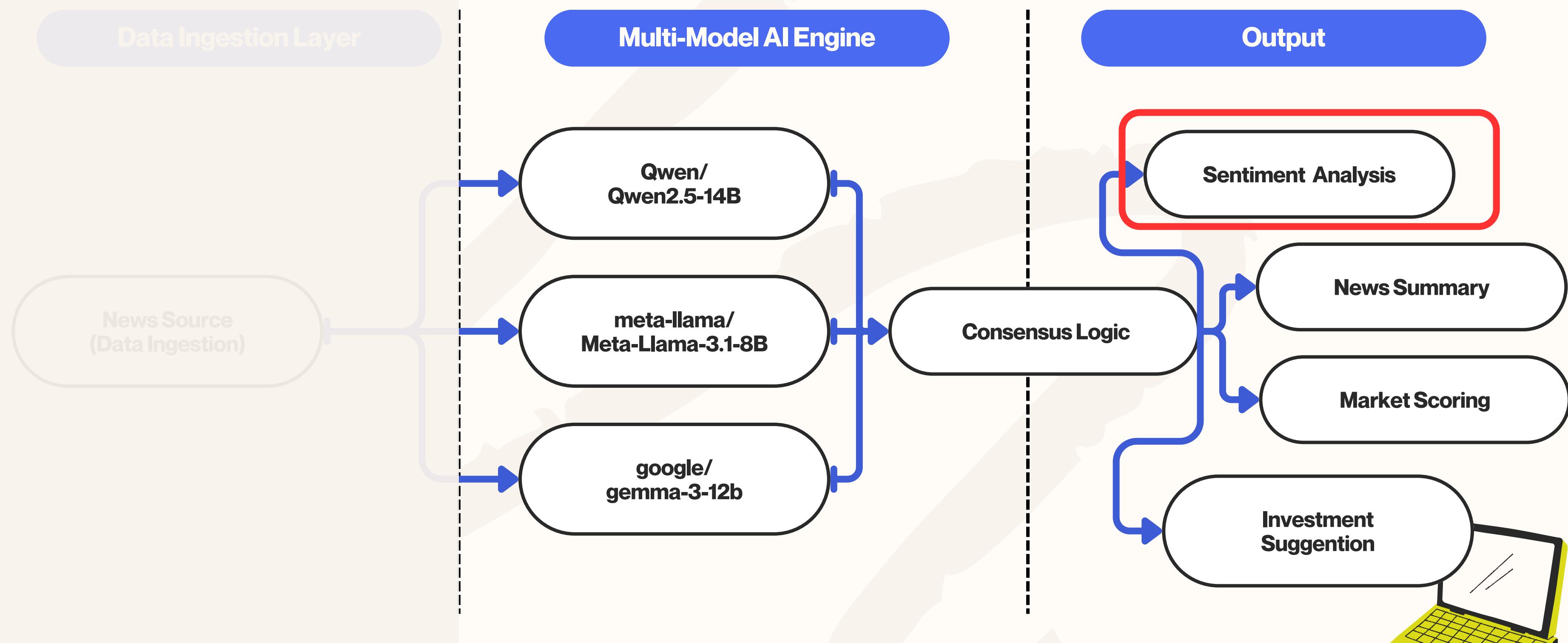


How the solution works





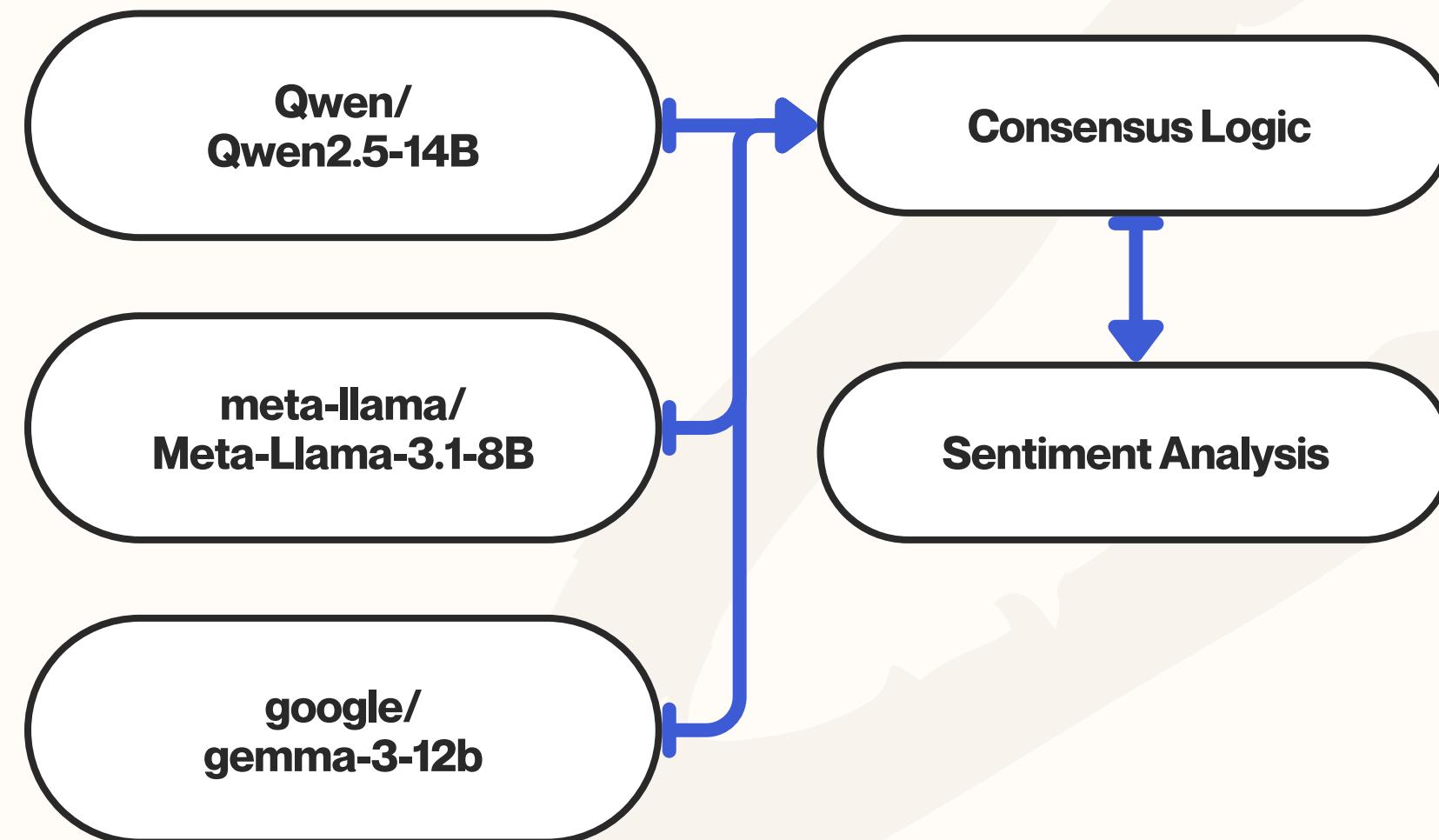
How the solution works





Multi-Model AI Engine

Sentiment Analysis



Sentiment Analysis

Latest News (11396 items)

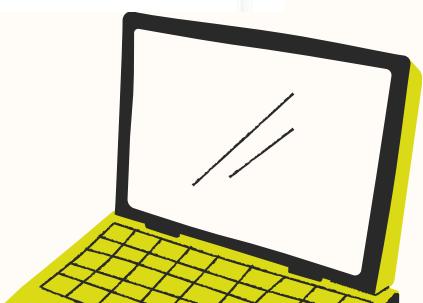
- INVESTING.COM • 15 JAN 2026 06:34
[Sanofi receives China approval for Myqorzo and Redemplo drugs](#)
Healthcare, Basic Materials
Sanofi SA (EPA:SASY) has received approval from Chinese regulators for two of its medications, Myqorzo and Redemplo. Myqorzo, a cardiac myosin inhibitor, has been approved for the treatment of obstruc...

AI Summary : Sanofi has expanded its presence in China with the approval of two new drugs, Myqorzo for treating obstructive hypertrophic cardiomyopathy and Redemplo for familial chylomicronemia syndrome.
- INVESTING.COM • 15 JAN 2026 06:34
[Coinbase CEO opposes major US crypto bill, clouding regulatory outlook](#)
Financials
Investing.com-- Coinbase Global Inc's (NASDAQ:COIN) Chief Executive Brian Armstrong said on Wednesday the leading U.S. cryptocurrency exchange cannot support a major draft crypto regulation bill in it...

AI Summary : Coinbase's CEO opposes a major U.S. crypto regulation bill, citing several issues that could harm the industry, which casts doubt on the bill's prospects in the Senate.
- REUTERS • 15 JAN 2026 06:18
[Saks Global obtains US court approval for \\$400 million in rescue financing](#)
Consumer Cyclicals
Jan 14 - A U.S. bankruptcy judge on Wednesday granted initial approval of Saks Global's bankruptcy financing, allowing the company to draw on \$400 million in new cash despite an objection from Saks' e...

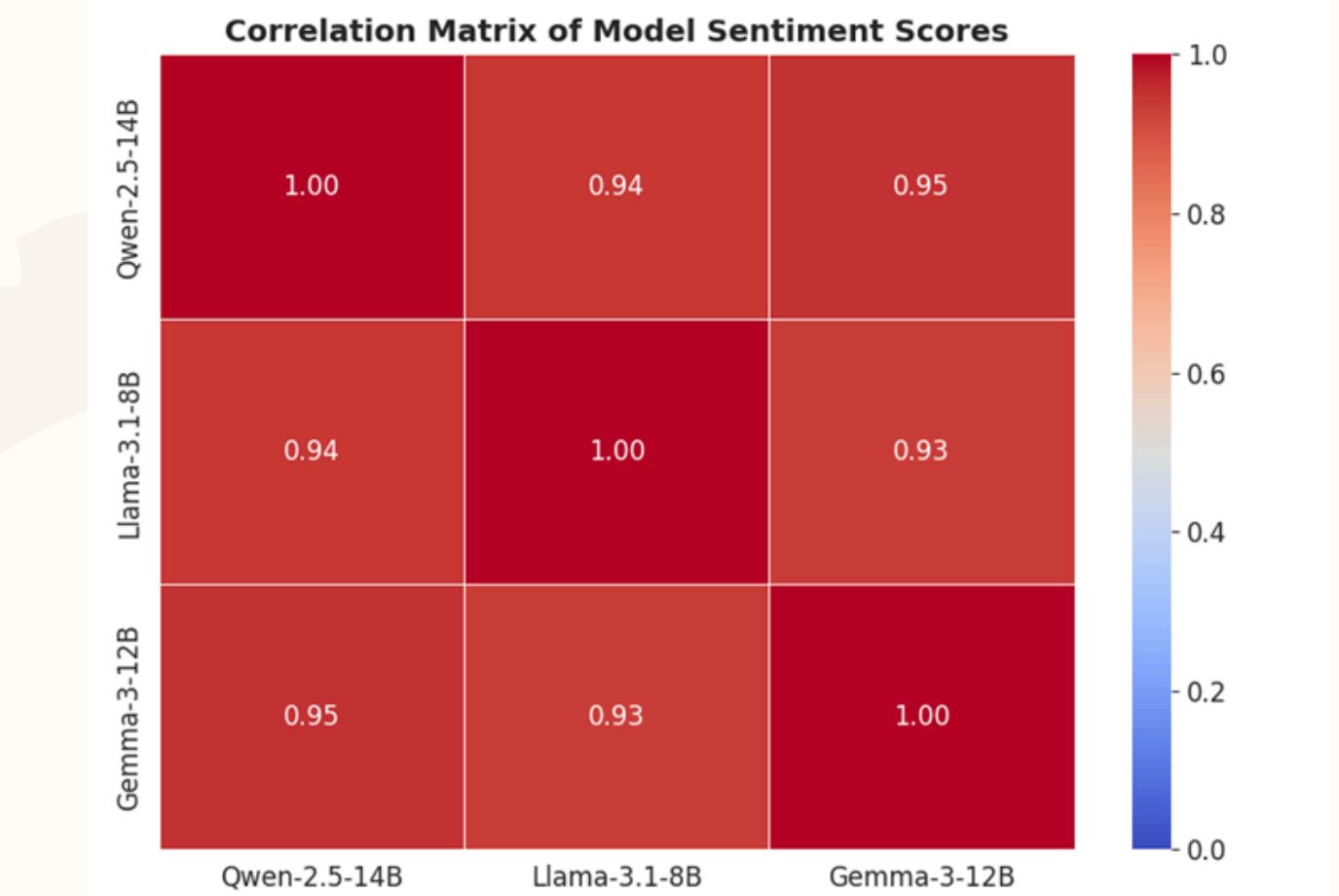
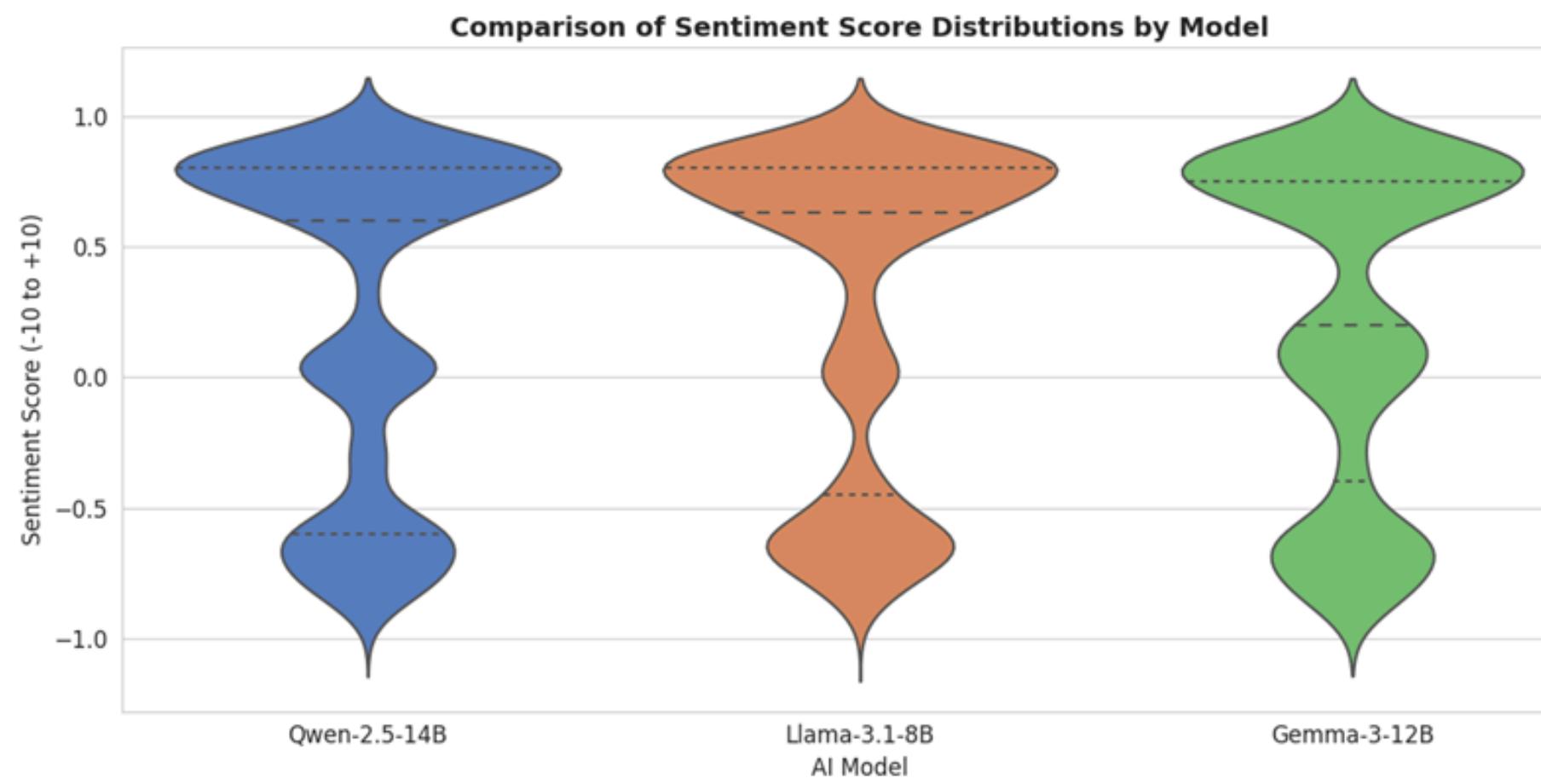
AI Summary : A U.S. bankruptcy judge approved Saks Global's request for \$400 million in rescue financing, despite objections, to help stabilize the company and restructure its debt following a failed merger with Neiman Marcus.
- REUTERS • 15 JAN 2026 06:00
[TSMC fourth-quarter profit leaps to record driven by AI boom](#)
Technology
TSMC, the world's main producer of advanced AI chips and a major supplier to Nvidia, on Thursday posted a 35% jump in fourth-quarter profit to record levels that handily beat market forecasts on Thurs...

AI Summary : TSMC reported a 35% surge in fourth-quarter profit to a record T\$505.7 billion, surpassing forecasts, primarily due to the booming demand for advanced AI chips.



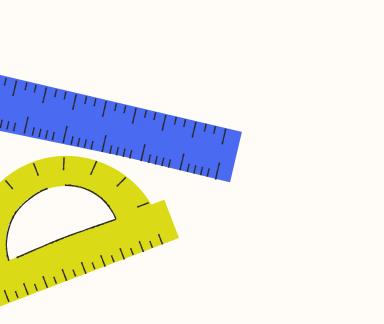
Multi-Model AI Engine

Sentiment Analysis

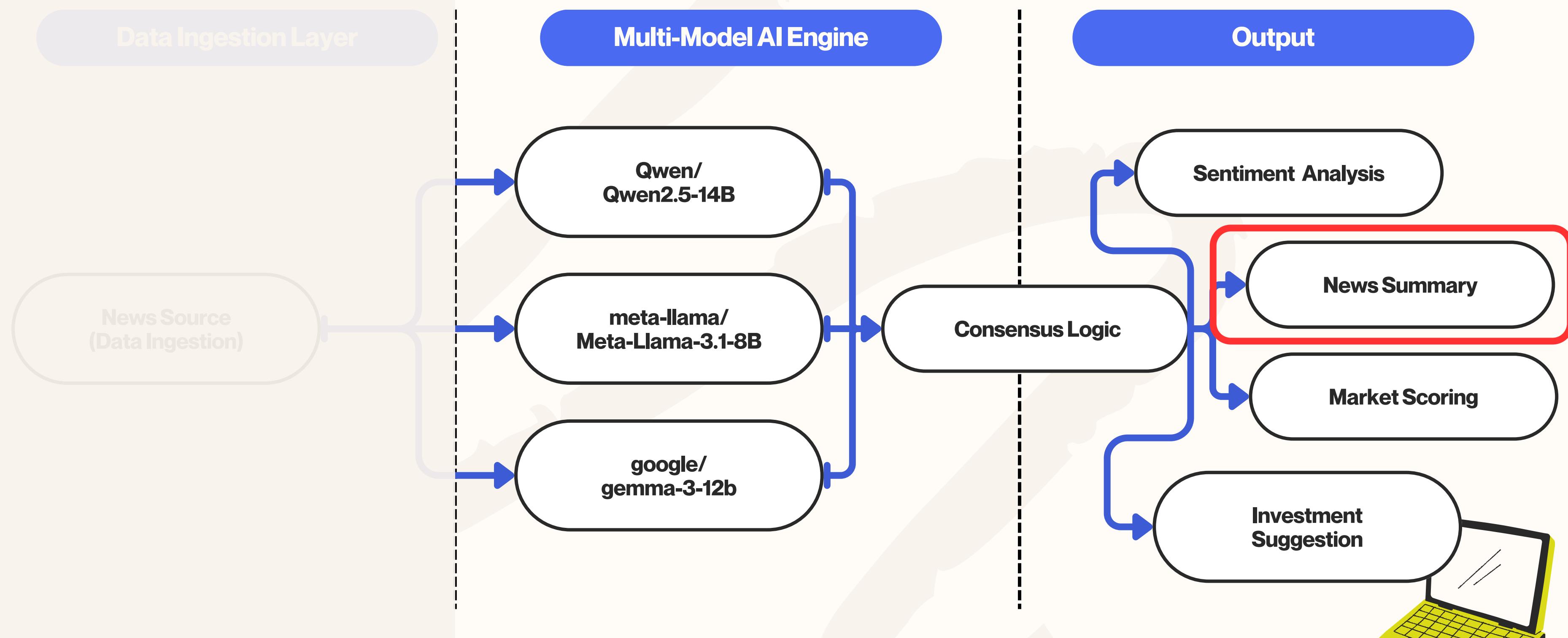


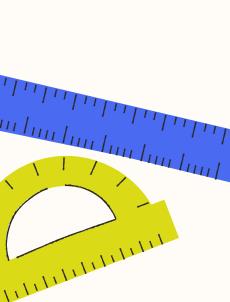
▲ Comparison of Sentiment Score Distributions by Model

▲ Correlation Matrix of Model Sentiment Scores



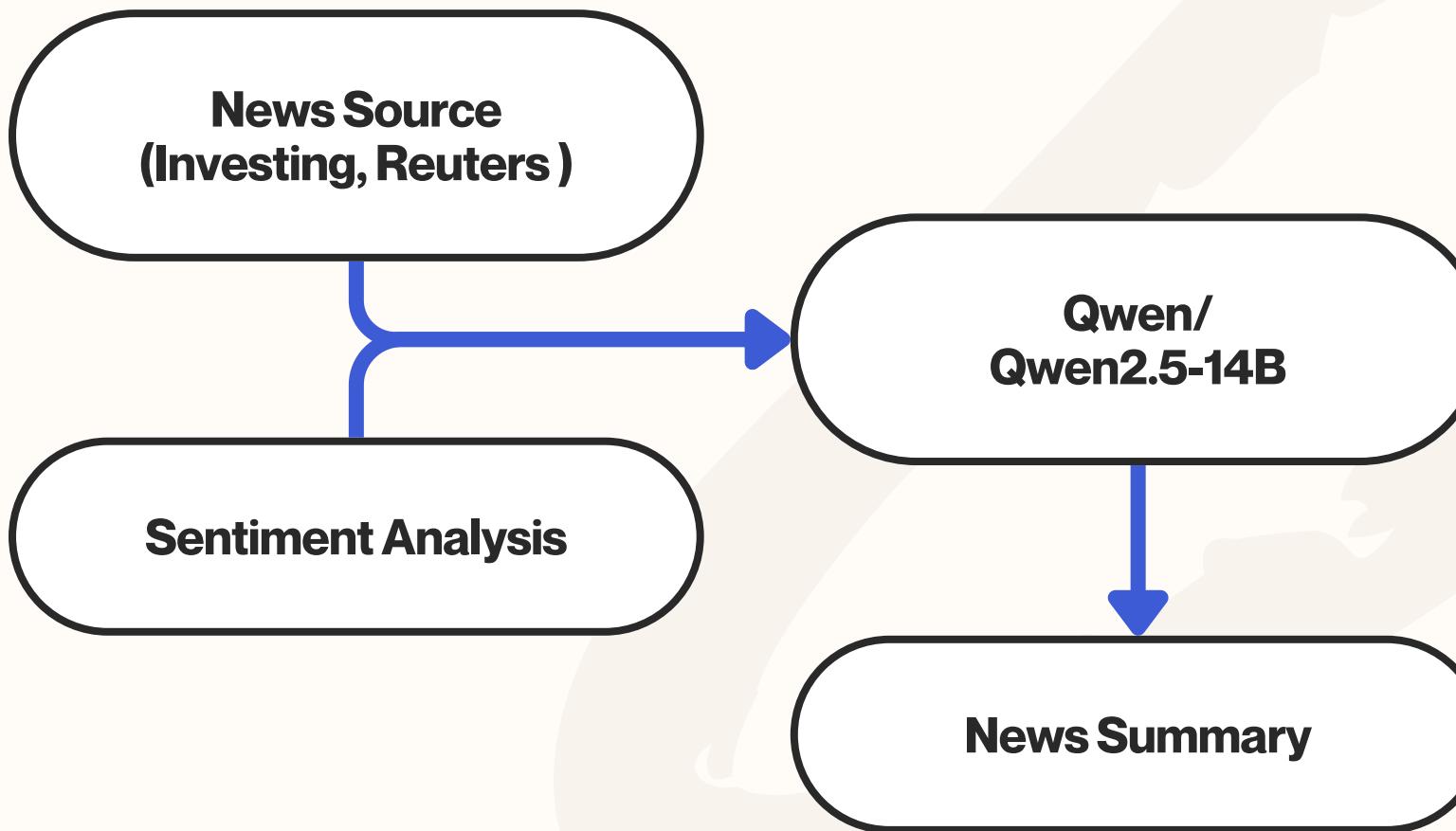
How the solution works





Multi-Model AI Engine

News Summary



News Summary

INVESTING.COM • 15 JAN 2026 05:42

[TSMC Q4 profit jumps more than expected to record high on robust AI demand](#)

Technology Industrials

- a trend that sparked a major ballooning in its earnings and valuation over the past two years. The company has greatly benefited from a mad rush among the world's largest technology companies to bui...

AI Summary : TSMC reported a record-breaking fourth-quarter profit surpassing expectations, driven by strong artificial intelligence demand for its advanced chips, particularly those at the 3-nanometer level.

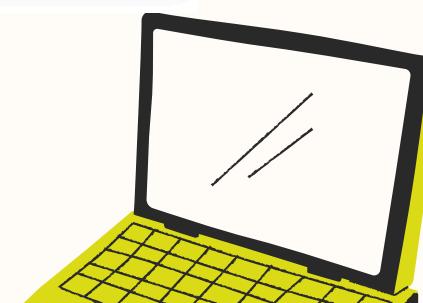
REUTERS • 15 JAN 2026 05:18

[Australian Rio Tinto investor raises concerns over merits of potential Glencore deal](#)

Basic Materials

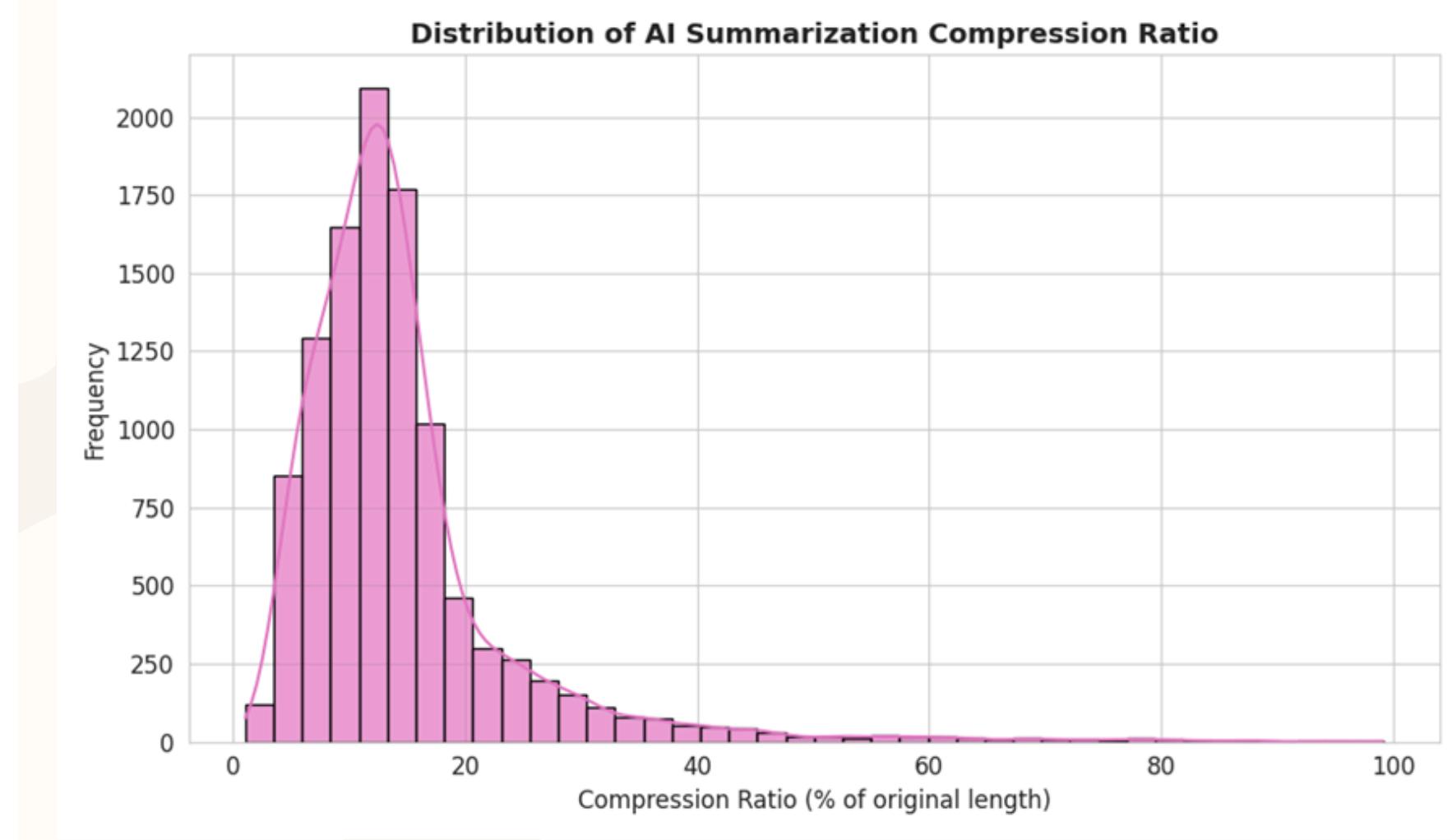
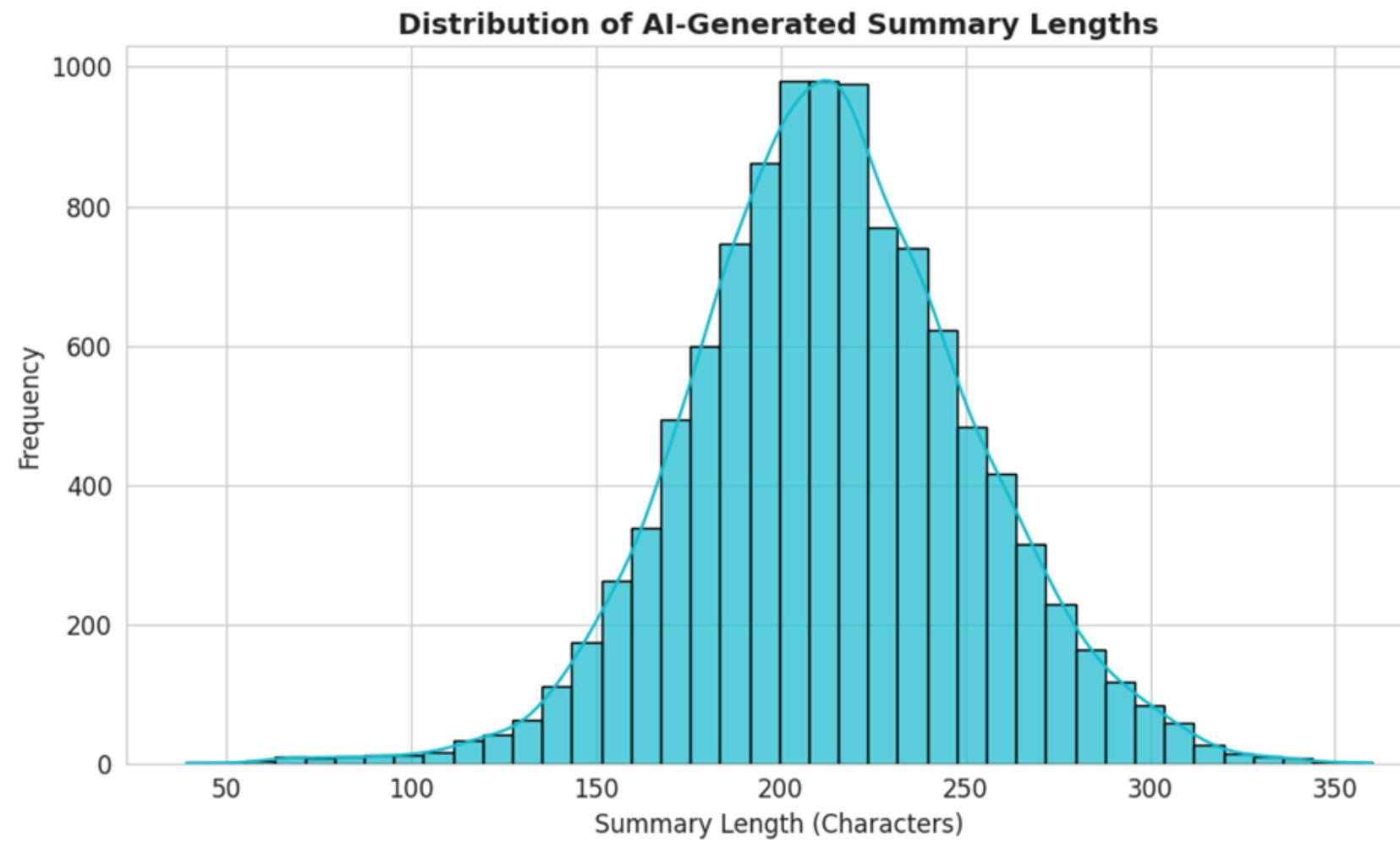
One of Australia's oldest and largest investors has added to the growing local chorus of concerns about Rio Tinto's potential acquisition of Glencore , questioning the proposed tie-up's merits and ti...

AI Summary : An Australian long-term investor has expressed skepticism about the potential merger between Rio Tinto and Glencore, questioning its value creation potential and timing.



Multi-Model AI Engine

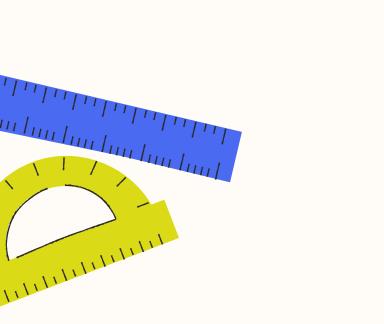
News Summary



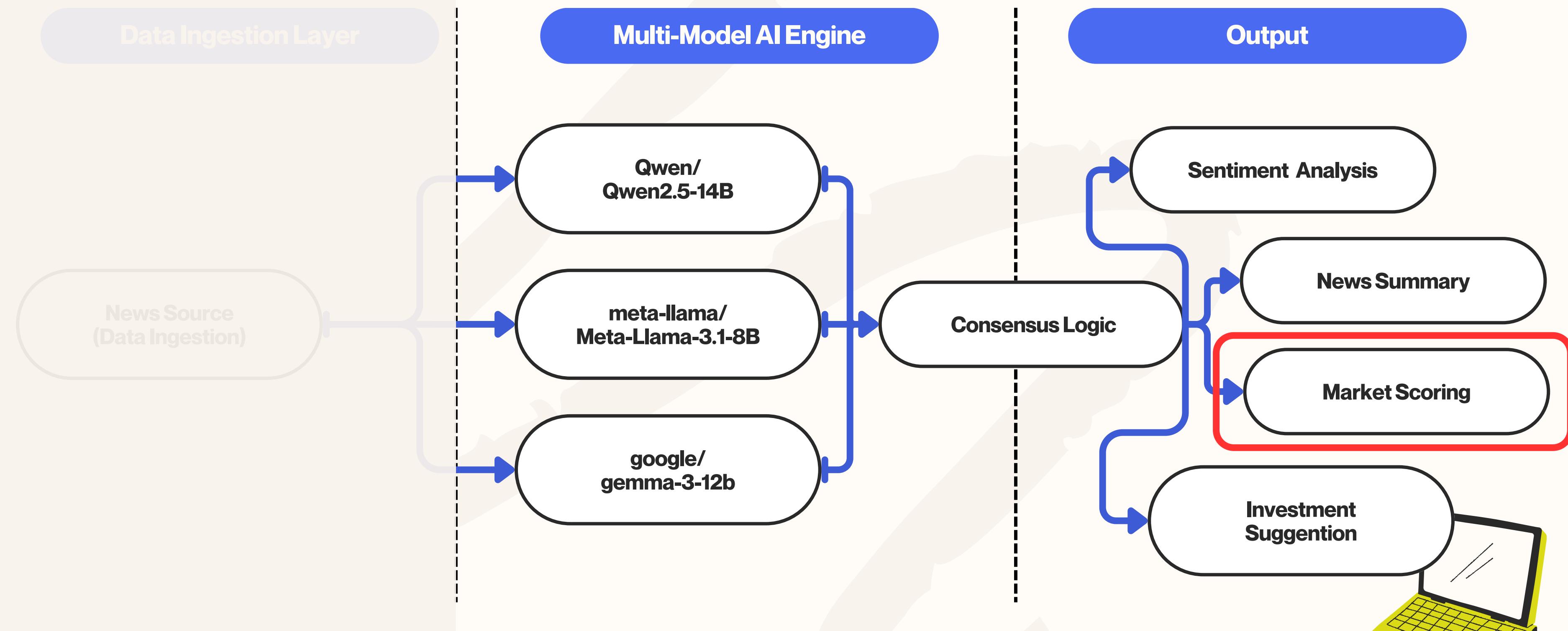
Distribution of News Summary Lengths



Distribution of Summarization Compression Ratios

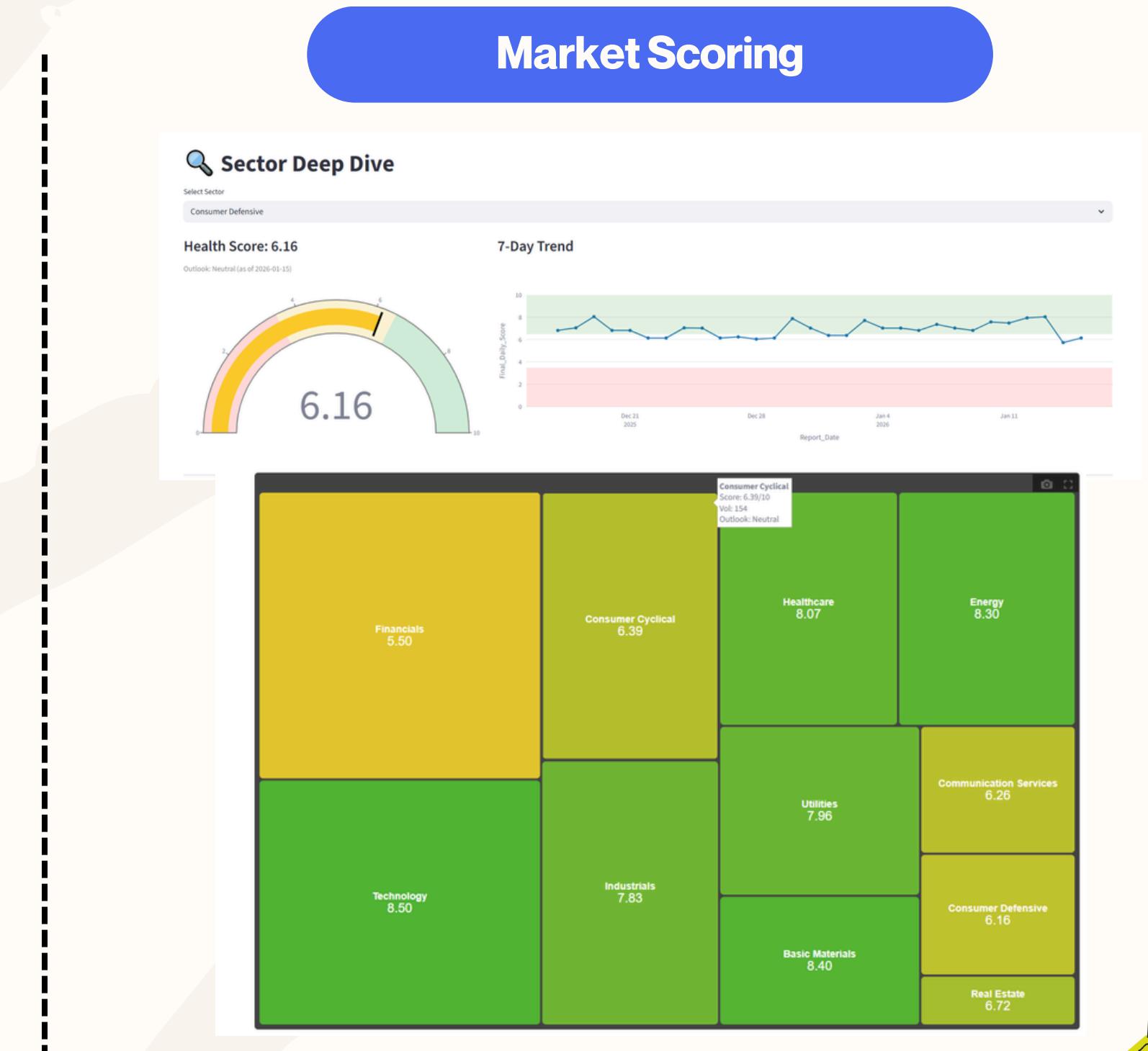
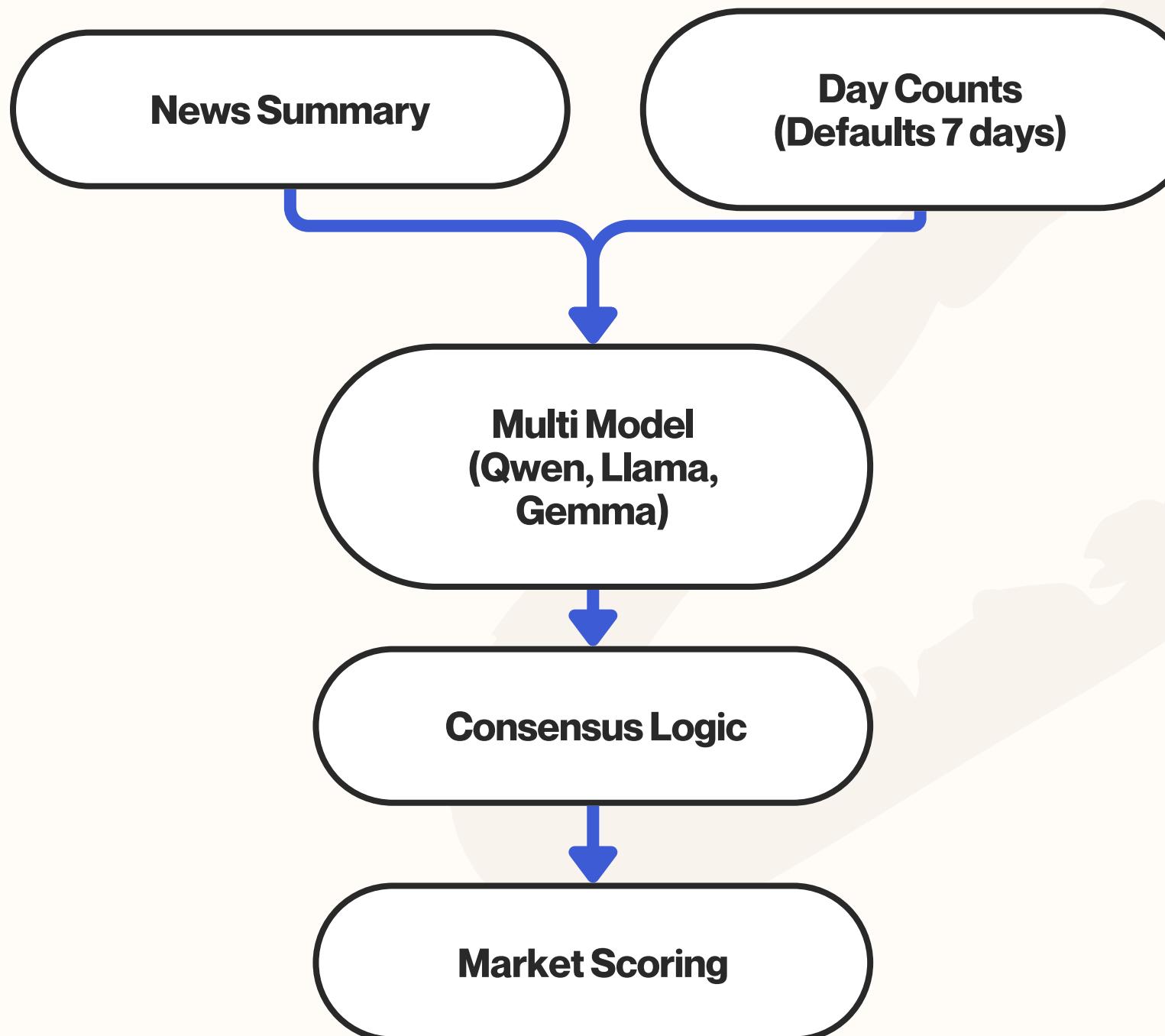


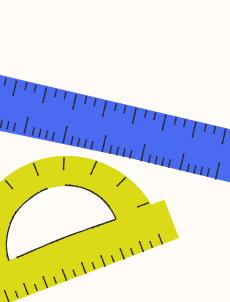
How the solution works



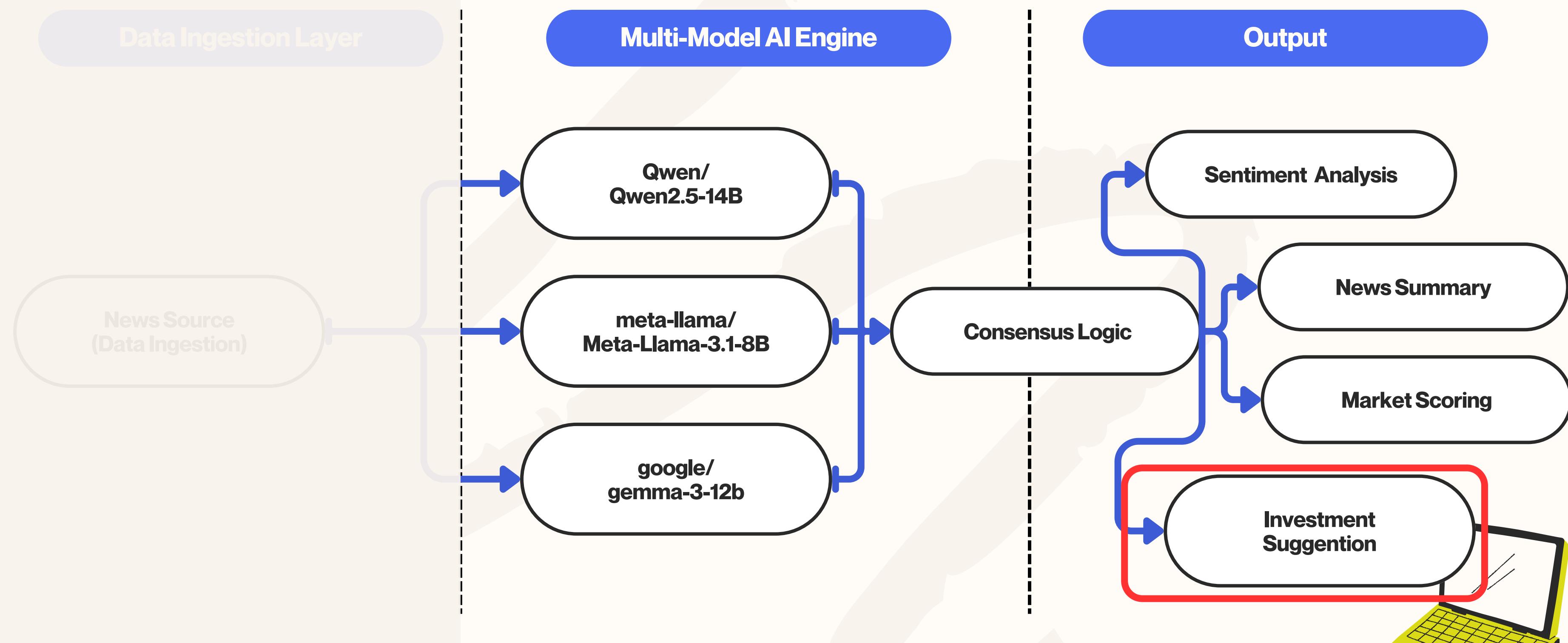
Multi-Model AI Engine

Market Scoring



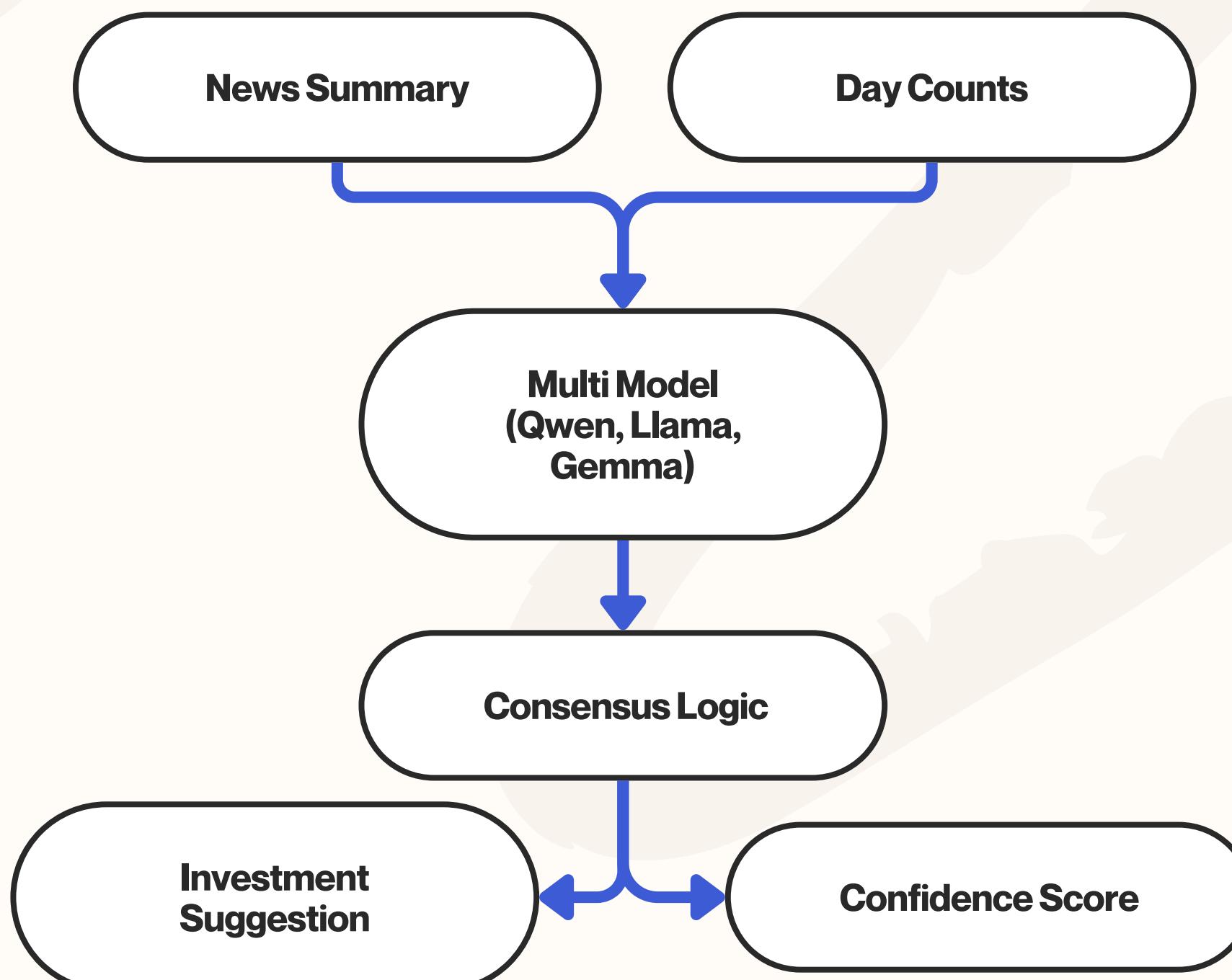


How the solution works



Multi-Model AI Engine

Investment Suggestion



Investment Suggestion

AI Investment Strategy

QWENY BUY

Suggested by Qwen/Qwen2.5-14B...

The financials sector faces mixed signals as positive earnings reports and growth in key areas contrast with regulatory headwinds and operational setbacks. Notably, Wells Fargo's profit miss and Coinbase's regulatory opposition highlight lingering risks. However, strong performances from Bank of America and Citigroup indicate resilience and potential for continued growth.

LLAMY HOLD

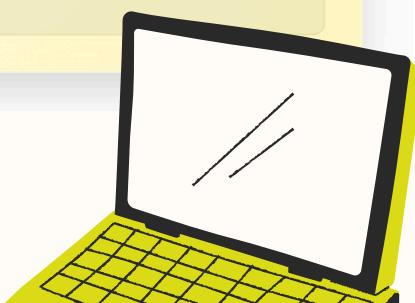
Suggested by meta-llama/Meta-Lia...

Financials sector attractiveness is mixed, with some positive catalysts like Toyota Industries' record high and Bank of America's strong earnings, but also concerns over Wells Fargo's profit miss and Coinbase's opposition to U.S. crypto regulation. The sector's overall momentum is neutral, with some stocks experiencing significant fluctuations. Regulatory risks and macroeconomic uncertainties remain a concern.

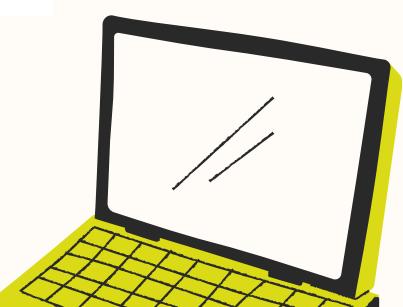
GEMMY HOLD

Suggested by google/gemma-3-12...

The Financials sector presents a mixed picture. While major U.S. banks like Bank of America and Citigroup reported strong earnings driven by loan demand and dealmaking, Wells Fargo's disappointing results and concerns surrounding CEO streamlining efforts introduce caution. The ongoing regulatory uncertainty surrounding cryptocurrency, highlighted by Coinbase's opposition to a key bill, adds another layer of risk, though the potential for growth in areas like trade finance remains. The sector's resilience is evident, but headwinds persist.

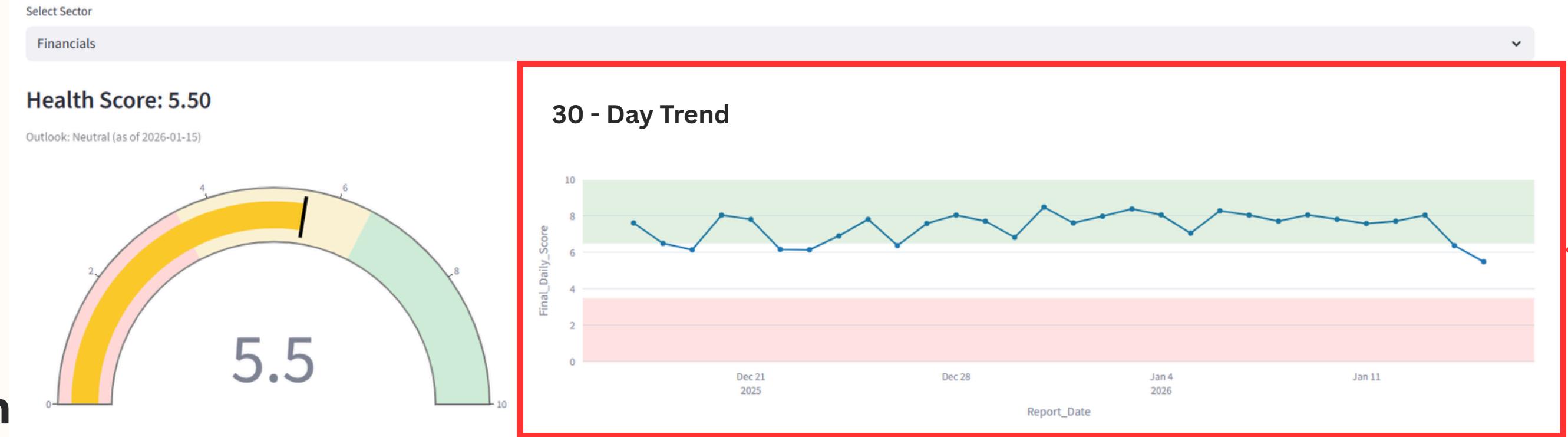


Key Function



Key Function

AI Sugesstion



AI Investment Strategy

QWENY BUY

Suggested by Qwen/Qwen2.5-14B-Instruct

The financials sector faces mixed signals as positive earnings reports and growth in key areas contrast with regulatory headwinds and operational setbacks. Notably, Wells Fargo's profit miss and Coinbase's regulatory opposition highlight lingering risks. However, strong performances from Bank of America and Citigroup indicate resilience and potential for continued growth.

LLAMY HOLD

Suggested by meta-llama/Meta-Llama-3.1-8B-Instruct

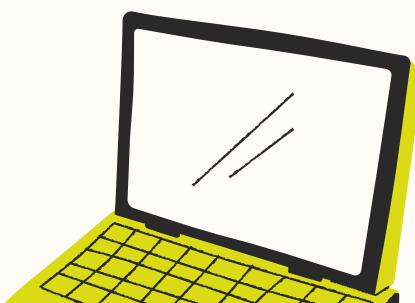
Financials sector attractiveness is mixed, with some positive catalysts like Toyota Industries' record high and Bank of America's strong earnings, but also concerns over Wells Fargo's profit miss and Coinbase's opposition to U.S. crypto regulation. The sector's overall momentum is neutral, with some stocks experiencing significant fluctuations. Regulatory risks and macroeconomic uncertainties remain a concern.

GEMMY HOLD

Suggested by google/gemma-3-12b-it

The Financials sector presents a mixed picture. While major U.S. banks like Bank of America and Citigroup reported strong earnings driven by loan demand and dealmaking, Wells Fargo's disappointing results and concerns surrounding CEO streamlining efforts introduce caution. The ongoing regulatory uncertainty surrounding cryptocurrency, highlighted by Coinbase's opposition to a key bill, adds another layer of risk, though the potential for growth in areas like trade finance remains. The sector's resilience is evident, but

30-Day Trend



Key Function

MarketMind

INVESTING.COM • 15 JAN 2026 06:34

[Sanofi receives China approval for Myqorzo and Redemplo drugs](#)

Healthcare, Basic Materials

Sanofi SA (EPA:SASY) has received approval from Chinese regulators for two of its medications, Myqorzo and Redemplo. Myqorzo, a cardiac myosin inhibitor, has been approved for the treatment of obstruc...

AI Summary : Sanofi has expanded its presence in China with the approval of two new drugs, Myqorzo for treating obstructive hypertrophic cardiomyopathy and Redemplo for familial chylomicronemia syndrome.

INVESTING.COM • 15 JAN 2026 06:34

[Coinbase CEO opposes major US crypto bill, clouding regulatory outlook](#)

Financials

Investing.com-- Coinbase Global Inc's (NASDAQ:COIN) Chief Executive Brian Armstrong said on Wednesday the leading U.S. cryptocurrency exchange cannot support a major draft crypto regulation bill in it...

AI Summary : Coinbase's CEO opposes a major U.S. crypto regulation bill, citing several issues that could harm the industry, which casts doubt on the bill's prospects in the Senate.

REUTERS • 15 JAN 2026 06:18

[Saks Global obtains US court approval for \\$400 million in rescue financing](#)

Consumer Cyclicals

Jan 14 - A U.S. bankruptcy judge on Wednesday granted initial approval of Saks Global's bankruptcy financing, allowing the company to draw on \$400 million in new cash despite an objection from Saks' e...

AI Summary : A U.S. bankruptcy judge approved Saks Global's request for \$400 million in rescue financing, despite objections, to help stabilize the company and restructure its debt following a failed merger with Neiman Marcus.

REUTERS • 15 JAN 2026 06:00

[TSMC fourth-quarter profit leaps to record driven by AI boom](#)

Technology

TSMC, the world's main producer of advanced AI chips and a major supplier to Nvidia, on Thursday posted a 35% jump in fourth-quarter profit to record levels that handily beat market forecasts on Thurs...

AI Summary : TSMC reported a 35% surge in fourth-quarter profit to a record T\$505.7 billion, surpassing forecasts, primarily due to the booming demand for advanced AI chips.

Manage app

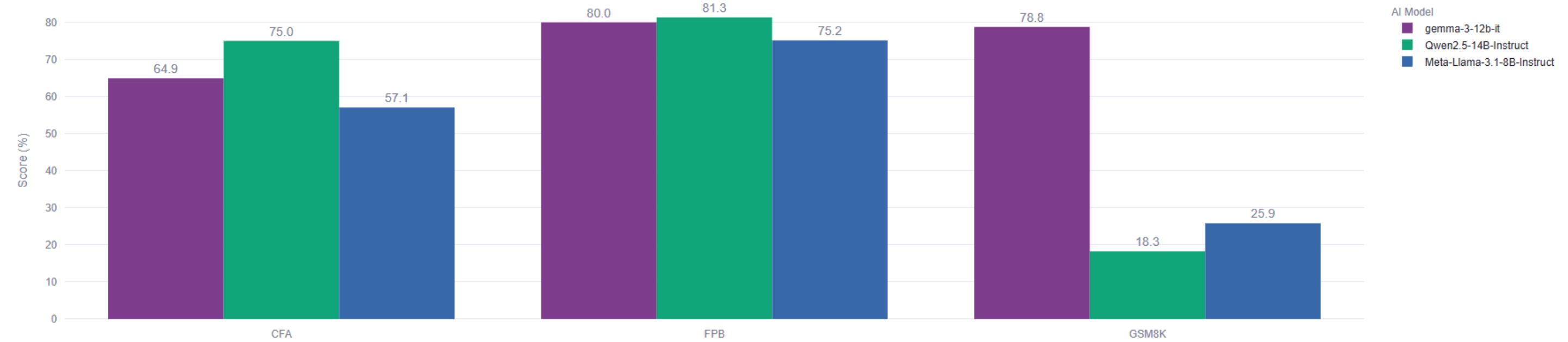
AI Summary

LLM Benchmark

Share    

Performance Results

Score Comparison by Category (Scale: 0-100%)

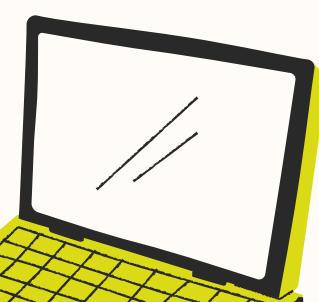


AI Model
gemma-3-12b-it
Qwen2.5-14B-Instruct
Meta-Llama-3.1-8B-Instruct

Detailed Scores

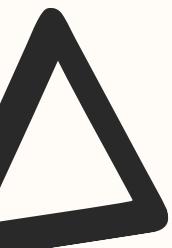
	Model Name	Average Score	CFA (Knowledge)	CFA Correct/Total	FPB (Sentiment)	FPB Correct/Total	GSM8K (Logic)	GSM8K Correct/Total
0	gemma-3-12b-it	<div style="width: 74.56%;"></div> 74.56%	<div style="width: 64.92%; background-color: #2e7131;"></div> 64.92%	670/1032	<div style="width: 80.00%; background-color: #2e7131;"></div> 80.00%	776/970	<div style="width: 78.77%; background-color: #2e7131;"></div> 78.77%	1039/1319
1	Qwen2.5-14B-Instruct	<div style="width: 58.20%;"></div> 58.20%	<div style="width: 75.00%; background-color: #2e7131;"></div> 75.00%	774/1032	<div style="width: 81.34%; background-color: #2e7131;"></div> 81.34%	789/970	<div style="width: 18.27%;"></div> 18.27%	241/1319
2	Meta-Llama-3.1-8B-Instruct	<div style="width: 52.69%;"></div> 52.69%	<div style="width: 57.07%;"></div> 57.07%	589/1032	<div style="width: 75.15%;"></div> 75.15%	729/970	<div style="width: 25.85%;"></div> 25.85%	341/1319

 Manage app





Tools & Technology



Technology

Module 1

Data Acquisition & Processing

Tools : Python, Pandas, NumPy

- **DataFrame Utilization** : Applied DataFrame structures to efficiently manage and manipulate raw CSV data.
- **Data Cleaning** : Implemented robust cleaning pipelines to handle null values and remove special characters from unstructured news text.
- **Feature Engineering** : Transformed raw data into meaningful features, including datetime conversion and strategic sector grouping.

Technology

Module 7

Artificial Intelligence & NLP

Tools : Hugging Face (Transformers), PyTorch, LLMs (Qwen, Llama, Gemma)

- **Transfer Learning** : Leveraged advanced Pre-trained Models to perform complex analysis without the need for training from scratch.
- **Prompt Engineering** : Designed precise system prompts to enforce strict JSON/CSV output formats from the LLMs.
- **Ensemble Learning** : Adopted ensemble concepts by aggregating consensus votes from 3 different AI models to maximize accuracy.

Technology

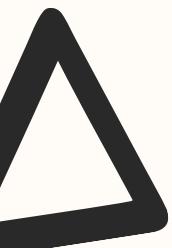
Data Visualization & UI

Tools: Streamlit, Plotly Express, Plotly Graph Objects

- **Strategic Visualization :** Selected optimal chart types for specific insights (e.g., Treemaps for market overview, Gauge Charts for health scores, Line Charts for trends).
- **Interactive UX Design :** Developed a responsive user interface allowing for data drill-downs into specific sectors.



Impact / Values



Impact / Values



Impact

- Helps assess price volatility
- Supports short-term entry and exit decisions
- Identifies Risk-On / Risk-Off market conditions

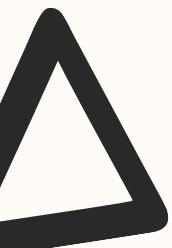


Values

- Supports Buy / Hold / Sell decisions
- Helps evaluate risk and valuation
- Guides medium- to long-term investment strategy



Future Plan



Future Plan

DATA EXPANSION

Incorporate local market news
(e.g., Thai stock market, ASEAN region)

SUBSCRIPTION SYSTEM

Subscribe to unlock a wider range of premium
LLMs enabling richer, multi-dimensional
market insights.

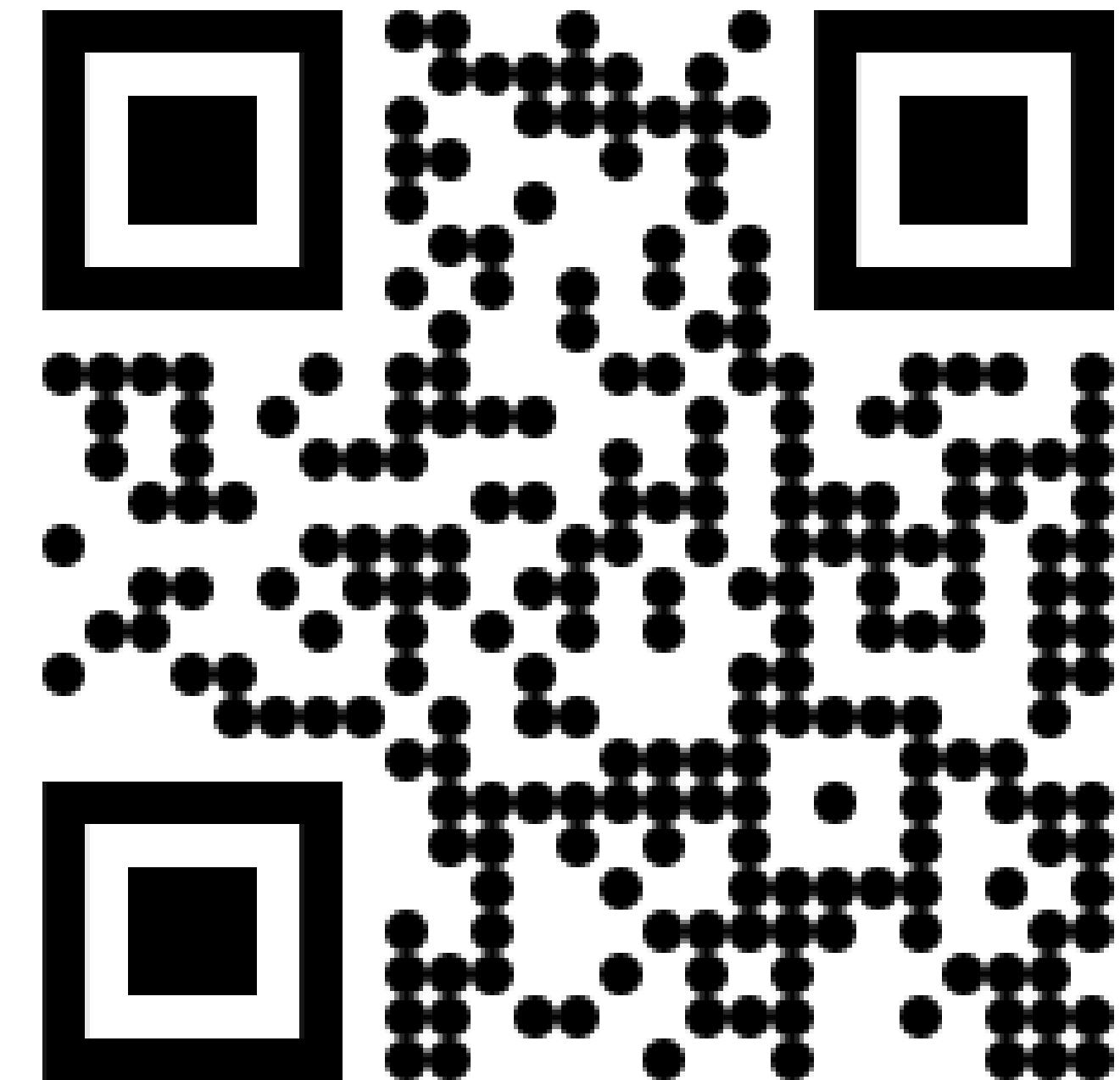
USER PERSONALIZATION

Customizes news, risk signals, and insights
based on each user's risk profile, investment
horizon, and interests.

DEMO

MarketMind

<https://4tuathb.streamlit.app/>



Thank You

