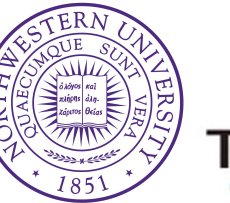
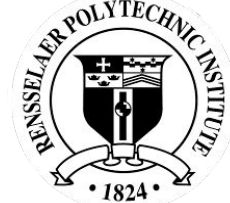


Professional Readiness of LLMs in Financial Regulations?

A Report of Regulations Challenge at COLING 2025

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ICAIF 2024
International Conference on AI in Finance

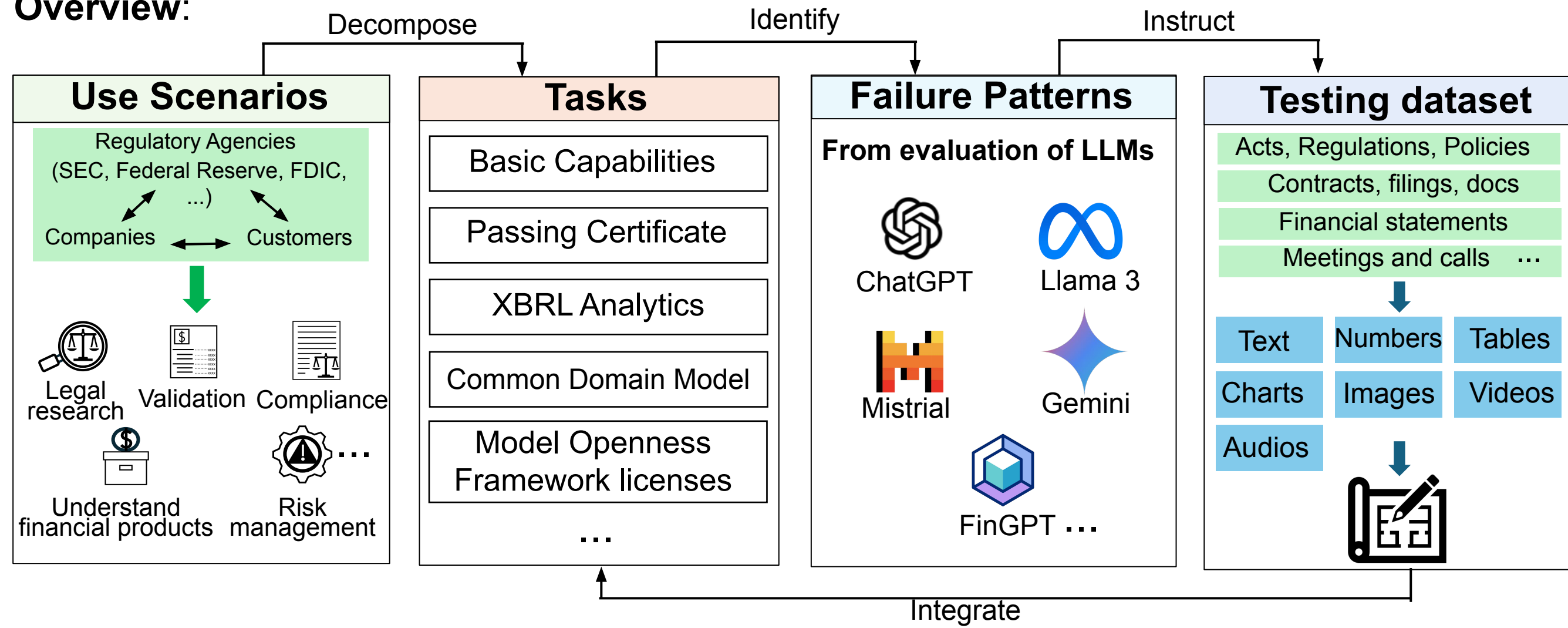
A chatbot with multimodal capabilities is envisioned to revolutionize the current financial regulatory process, saving time and reducing cost of compliance, communication, and operations among regulatory agencies, companies, and customers.

Regulations Challenge @ COLING 2025

Objective:

- Challenge the academic community to identify the strengths and limitations of LLMs in the context of financial regulation.
- Raise awareness of the professional readiness of LLMs.

Overview:



Tasks:

Category	Tasks	Assess LLMs' ability to	Example
Basic Capabilities	Abbreviation Recognition	recognize acronyms and stock tickers from financial regulatory texts.	IPO – Initial Public Offering ICO – Initial Coin Offering
	Definition Recognition	define terms and phrases used in financial regulatory and compliance documentation.	Stakeholder – a party who has an interest and might be affected by the performance and outcome of an entity's business, project, or enterprise.
	Named Entity Recognition (NER)	identify and classify entities in a statement about financial regulation.	<u>Regulation (EU) No 648/2012</u> of the <u>European Parliament</u> and of the <u>Council</u> of 4 July 2012 on OTC derivatives, central counterparties and trade repositories ("EMIR") entered into force on <u>16 August 2012</u> .
	Question Answering	answer questions about financial regulations accurately.	How do Basel III regulations, including the FRTB, aim to enhance market stability?
	Link Retrieval	retrieve and provide the exact link to specific regulations.	Regulation (EU) 2019/834 -- https://eur-lex.europa.eu/eli/reg/2019/834/oj
Passing Certificate	Certificate Question	pass CFA and CPA exams	Phil Jones, CFA,... is about to issue an unfavorable report on the company. His manager does not want him to state any adverse opinions...
XBRL Analytics	XBRL Analytics	interpret, and analyze XBRL filings	What is the value of Walt Disney Co's Total Assets for the Fiscal Year ending in FY 2023?
CDM	CDM	answer questions related to the Common Domain Model	How is the TradeState data type utilized to track changes in a trade lifecycle in the Common Domain Model?
MOF	MOF Licenses	answer questions about the licensing requirements outlined in MOF	What licenses are recommended for Model Parameters under the Model Openness Framework?

Testing Datasets:

Category	Domain	Task	Size	Data sources
EMIR	European OTC derivative market	Abbreviation (115), Definition (50), NER (49), Link Retrieval (100)	314	EUR-LEX, ESMA
SEC statutes and regulations	US securities market	Abbreviation (76+3298), Definition (13), QA (19), Link Retrieval (18)	126 + 3298 (stock tickers)	SEC
Federal Reserve regulations	US banking system	Abbreviation (44), Definition (100), QA (107), Link Retrieval (16)	267	Federal Reserve
GAAP	Accounting and auditing	Abbreviation (50), Definition (30), QA (50)	130	FASB
Certificate	Ethics and regulations	Certificate Question	346	CFA, CPA exam
XBRL	XBRL	XBRL Analytics	1700	FinanceBench, XBRL reports, XBRL website
CDM	CDM for financial product management	CDM	99	CDM docs
MOF Licenses	MOF	MOF Licenses	161	OSI website, MOF docs

Chatbot Use Scenarios

Understand Financial Product: Presidential Election Bet

Prompt:
On Robinhood, there is a product called "presidential election contracts." Here is the website of this presidential election bet: <https://go.robinhood.com/election>. I also attached a screenshot for this product.
What are the product terms? How to buy it? Are there any fees or tax implications? What are the risks associated with this product? What are the factors that could influence the value of these contracts? In the screenshot, what is the current trend?

GPT-4o: Product Terms
Robinhood's presidential election contracts are event contracts based on the 2024 presidential election outcome. You can purchase a "Yes" contract predicting that either Kamala Harris or Donald Trump will win. **If your candidate is certified as president on January 7, 2025, each contract will pay \$1. Otherwise, it pays \$0.**

How to Buy
You can purchase a "Yes" contract for either candidate through Robinhood's platform but cannot hold contracts for both candidates simultaneously.

Fees and Tax Implications
• **Fees:** Robinhood charges a \$0.01 commission per contract, and the executing exchange (ForecastEx) retains an additional embedded \$0.01 within the contract pricing.
• **Tax:** Robinhood reports gains as required on forms like Form 1099. Consulting a tax professional for specific advice is recommended.

Risks
• **Market Volatility:** Contract values fluctuate based on real-time market sentiment.
• **Event Risk:** Payout depends on Congress certifying the winner, introducing political and procedural risks.
• **Financial Suitability:** The risk of loss in trading commodity interests is substantial, and these contracts may not suit all financial conditions.

Factors Influencing Value
The contract value is influenced by:
1. **Polling and Election Events:** News, debates, polls, and significant events impact perceived probability.
2. **Market Sentiment:** Real-time trading sentiment and open interest (number of contracts held) affect prices.
3. **Political Developments:** Any major political events, controversies, or shifts can impact contract value.
For detailed terms, risks, and disclosures, refer to Robinhood's [forecast contract risk disclosure](#).

Current Trend (Screenshot Analysis): In the screenshot, **Donald Trump is favoured at 79¢, while Kamala Harris is at 25¢. The price of Trump's contract is trending higher than Harris's, indicating greater market confidence in his potential win.**

Screenshot uploaded:

Consult Legal Requirements: Patent in University

Prompt:
I am a professor in computer science at a public university. My lab has developed a novel facial recognition algorithm that enhances privacy. This invention is funded by a federal grant from the Department of Homeland Security. I am considering licensing this technology to a company for large-scale implementation and distribution. What rights do I and my university have for this invention? What specific requirements and limitations should I consider regarding disclosure, patent filing, and licensing for federally funded research?

Files uploaded:

CHAPTER 18—PATENT RIGHTS IN INVENTIONS MADE WITH FEDERAL ASSISTANCE

2000—Pub. L. 106-404, §4(b), Nov. 1, 2000, 114 Stat. 1744, substituted "Licensing federally owned inventions" for "Restrictions on licensing of federally owned inventions" in item 209.

1984—Pub. L. 98-220, title V, §501(5), Nov. 8, 1984, 98 Stat. 1366, added item 212.

1982—Pub. L. 97-256, title I, §101(5), Sept. 8, 1982, 96 Stat. 816, redesignated chapter 18, as added by Pub. L. 96-517, (Hear. Dec. 12, 1980, 96 Stat. 3019, comprising sections 209 to 211 as chapter 18, and transferred chapter 18, as so redesignated, so end of this part from end of part IV.

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GPT-4o:
The Bayh-Dole Act of 1980, which governs inventions made with federal assistance, will shape how you and your university can handle rights and responsibilities regarding this facial recognition technology developed with federal funds. Here are key aspects to consider:

- Ownership and Title:** As a university researcher funded by a federal grant, **you (or more precisely, your university) may elect to retain title to the invention.** However, the university must disclose the invention to the federal agency and comply with specific timelines and requirements for retaining title. **If the university fails to disclose or elect to retain title within the required timeframe, the government may claim ownership.**
- Patent Filing:** You are required to file a patent application for the invention within certain time limits after electing to retain title. This ensures that **the university holds formal intellectual property rights, while the government retains a non-exclusive, irrevocable license to practice or have practiced the invention** on behalf of the United States.
- March-In Rights:** **Federal agencies retain "march-in" rights,** meaning they can require the university or any licensee to grant additional licenses if the invention is not being adequately developed or utilized, especially if public needs are unmet, or the invention's benefits are not being made reasonably available to the public.
- Licensing Preferences:** The act mandates **preference for licensing to U.S. industry, particularly small businesses, where feasible.** Exclusive licensing agreements with non-U.S. manufacturers are generally discouraged unless domestic manufacturing is infeasible.
- Government Use Rights:** **Any patent applications filed must include a statement acknowledging government support,** specifying that the government holds certain rights to the invention. This protects the government's interests and ensures continued public access under reasonable terms.

Licensing Considerations:

- The university can pursue a licensing agreement,** but it must comply with Bayh-Dole Act provisions, ensuring that any agreement aligns with the rights retained by the government.
- Since you're interested in licensing to a company, your university will need to consider whether exclusive or non-exclusive licensing is appropriate,** and, if exclusive, the licensee must commit to U.S.-based manufacturing, unless granted a waiver by DHS.

In summary, you and your university have rights to retain and license the invention, but federal requirements like government-use rights, disclosure, and manufacturing conditions must be observed under the Bayh-Dole Act.

Professional Readiness? -- Failure Cases

Definition

Prompt:
What does "openwashing" mean?

Generation:
"Openwashing" is a term used to describe a practice where companies claim their software or technology is "open source" without fully committing to the principles of open-source accessibility and transparency. This accusation suggests that these companies may not genuinely provide open and freely available code.

In the context of AI, "openwashing" may refer to companies that partially open their AI models or platforms but retain significant control, limiting access to only certain parts of the code or data, or placing restrictions on how others can use, modify, or distribute it. This can mislead users into believing they have complete open-source access when they actually do not.

Why a failure case:
While the model provides a description of the phenomenon of openwashing, it does not fully explain the **accusation** expressed by the term, as highlighted in red in the picture. The accusation is not only that openwashing misleads users, but also that it has become a marketing tool that undermines the true meaning of openness..

Prompt:
I notice there is a similar word to openwashing. What does "greenwashing" mean?

Generation:
"Greenwashing" is when a company or organization makes misleading claims about its environmental practices or products to appear more eco-friendly than they actually are. The term combines "green" (relating to environmentalism) and "whitewashing" (covering up the truth).

Companies might greenwash by using vague language, highlighting a minor eco-friendly aspect of a product while ignoring larger environmental harms, or investing more in marketing their "green" efforts than actually implementing sustainable practices.

Why a failure case:
The definition of greenwashing given in the first sentence is not complete. It only discusses misleading claims, but **false claims** are also important and often lead to greater environmental damage. For example, Volkswagen launched "clean diesel" cars in 2009 but was found to cheat emissions tests for 11 million of its vehicles, which is more than just misleading. Including only misleading claims in the definition weakens the scope of greenwashing.

Openwashing
/b-pen-washing/
An accusation against some AI companies that they are using the "open source" label too loosely.

(Openwashing reported by New York Times on 05/17/2024)

GREENWASH INSTRUCTIONS:
PRETEND TO BE SUSTAINABLE
MANIPULATE
DISTRACT FROM EXPLOITATION OF PEOPLE & PLANET

Also Alexander/CDPA Images/lightfreaker via Getty Images

Model Openness Framework

Prompt:
What licenses are recommended for Model Parameters under the Model Openness Framework?

Generation:
Under the Model Openness Framework, the recommended licenses for model parameters are the Apache 2.0 and MIT licenses. These licenses are often chosen for their permissive nature, allowing for wide use, modification, and distribution while providing legal protection.

Why a failure case:
The model response is misinformation. To date, model producers have been releasing model parameters (i.e., weights and biases) using an open source software license, such as Apache 2.0 and MIT, even though model parameters are not compatible with such licenses. As outlined in MOF, since model parameters are in fact data, model parameters should be distributed under an open data license, like CDLAPermissive-2.0.

XBRL Analytics

Prompt:
I am analyzing Coca Cola's income statements and balance sheets to learn how the company performed last year. What is the return on assets (ROA) for Coca Cola in 2023?

Response:
To determine the Return on Assets (ROA) for Coca-Cola for FY2023, we need to calculate the ROA using the formula:

$$ROA = \frac{FY2023 \text{ Net Income}}{\text{Average Total Assets}}$$

From the provided XBRL data:

- Net Income for FY2023:** The net income for FY2023 is given as "us-gaap:NetIncomeLoss" with contextRef="c-1", which is \$10,714,000,000.
- Average Total Assets:**
 - Total Assets for FY2023: The total assets for 2023 is given as "us-gaap:Assets" with contextRef="c-26", which is \$92,763,000,000.
 - Total Assets for FY2022: The total assets for 2022 is given as "us-gaap:Assets" with contextRef="c-23", which is \$97,703,000,000.

We calculate the average total assets as:

$$\text{Average total assets} = \frac{FY2023 \text{ Total Assets} + FY2022 \text{ Total Assets}}{2} = \frac{92,763,000,000 + 97,703,000,000}{2} = 95,233,000,000$$

3. Calculate ROA:

$$ROA = \frac{10,714,000,000}{95,233,000,000} = 0.1125$$

Thus, the ROA for Coca-Cola for FY2023 is **11.25%**.

THE COCA-COLA COMPANY AND SUBSIDIARIES

CONSOLIDATED BALANCE SHEETS
(In millions except par value)

	2023	2022
ASSETS		
Current Assets		
Cash and cash equivalents	\$ 9,366	\$ 9,519
Short-term investments	2,997	1,043
Total Cash, Cash Equivalents and Short-Term Investments	12,363	10,562
Marketable securities	1,300	1,069
Trade accounts receivable, less allowances of \$502 and \$516, respectively	3,410	3,487
Inventories	4,424	4,233
Prepaid expenses and other current assets	9,235	3,240
Total Current Assets	26,732	22,591
Equity method investments	19,671	18,264
Other investments	118	501
Other noncurrent assets	7,162	6,189
Deferred income tax assets	1,561	1,746
Property, plant and equipment—net	9,236	9,841
Trademarks with indefinite lives	14,249	12,214
Goodwill	18,398	18,782
Other intangible assets	816	635
Total Assets	\$ 92,763	\$ 92,703