Ontology Development

Assignment 3

Authors:
A Anunaya (CS24M009)
Debasmita Mandal (CS24M015)
Arnav Karn (CS24M801)
Kagose Yohanes Okoll (CS24M802)
Kenaw Nuru Muhabe (CS24M803)

Table of Contents

Report on Updates for Stock Market Ontology

Introduction

In the process of refining our ontology, a few axioms were modified to enhance the representation of various concepts related to investors, trade orders, financial instruments, penalties, and companies in the OWL file. This report details the changes made, highlights the intent behind them, and discusses the implications for the overall structure of the ontology.

Changes Made

1. Investor Class Definition

- **Original Intent:** To categorize every investor as either a retail investor, domestic institutional investor (DII), or foreign institutional investor (FII).
- **Change Made:** The Investor class now uses an owl:unionOf construct, which allows for the inclusion of subclasses:
    i. RetailInvestor
    ii. DomesticInstitutionalInvestor
    iii. ForeignInstitutionalInvestor
- **Outcome:** This restructuring provides a clear categorization of investors, enhancing the ontology's ability to manage different investor types effectively.

2. TradeOrder Class Definition

- **Original Intent:** To define trade orders in terms of their types.
- **Change Made:** Implemented a similar owl:unionOf construct for the TradeOrder class to encompass:
    i. MarketOrder
    ii. LimitOrder
- **Outcome:** This facilitates precise classification of trade orders, enabling better analysis and processing of trading activities.

3. PublicCompany Class Definition

- **Original Intent:** To specify that a public company is one that has gone through an IPO.
- **Change Made:** The PublicCompany class now employs an owl:intersectionOf, requiring that it is a subclass of Company and has had an IPO:

    i. Ensures that only companies meeting these criteria are classified as public.
- **Outcome:** This provides clarity on the definition of public companies, enhancing the ontology's accuracy in representing market entities.

4. Enhanced Investor Class Definition

- **Original Intent:** To further refine the Investor class by ensuring every investor places at least one trade order and holds a portfolio.
- **Change Made:** Used an owl:intersectionOf to specify:
    i. Must place at least one TradeOrder.
    ii. Must hold a Portfolio.
- **Outcome:** This reinforces the notion that every investor is actively engaged in the market and maintains assets, enhancing the realism of the model.

5. FinancialInstrument Class Definition

- **Original Intent:** To establish that every financial instrument is tracked by a market index and has an associated risk level.
- **Change Made:** Introduced owl:unionOf to encapsulate:
    i. Tracking by at least one MarketIndex.
    ii. Having an associated RiskLevel.
- **Outcome:** This allows for a more nuanced understanding of financial instruments, essential for risk assessment and market analysis.

6. Penalty Class Definition

- **Original Intent:** To define a penalty imposed on various entities.
- **Change Made:** Revised to include an owl:Restriction that uses owl:unionOf to allow penalties to be imposed on:
    i. Investor
    ii. Company
    iii. Broker
- **Outcome:** This broadens the scope of penalties, ensuring that all relevant entities are considered in the context of financial governance.

7. TradeOrder Transaction Result

- **Original Intent:** To represent outcomes of trade orders.
- **Change Made:** Modified the TradeOrder class to stipulate that each order results in either:
    i. A SuccessfulTransaction
    ii. A FailedTransaction

    - **Outcome:** This distinction is vital for tracking performance metrics and for understanding market dynamics.

Implications of Changes

The updates made to the ontology significantly enhance its robustness and usability in stock market analysis. By clearly defining classes and their relationships, we improve the ontology's capability to support various applications, including:

- Risk Assessment: Enhanced definitions allow for better risk modeling for financial instruments.
- Market Analysis: Distinct categorization of investors and trade orders enables more granular market studies.
- Regulatory Compliance: Clear delineation of penalties can assist in ensuring compliance with financial regulations.

Conclusion

The revisions to the stock market ontology not only streamline the representation of critical stock market concepts but also lay the groundwork for advanced analytical capabilities. As the stock market landscape evolves, maintaining an adaptable and accurate ontology will be paramount to ensuring relevance and utility in decision-making processes.