THE WORLD BANK
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CASE STUDY

Artificial Intelligence to Streamline Investment Operations

The World Bank Treasury has developed and deployed a new tool that uses artificial intelligence (AI) to streamline investment operations of its internal and client asset management portfolios. The tool, called ASTRA (AI for Securities Terms Reconciliation and Analysis) uses AI to extract and analyze fixed income securities data directly from issuer source documents and reconciles it against data imported from third party providers. Improved data accuracy enables more efficient deployment of cash, enhancing investment returns.

Background

The World Bank Treasury provides asset management operations for over 70 different internal and client portfolios. This requires accurate projections of when and how much cash will be available for portfolio managers to invest daily.

The accuracy of cash balances is essential to minimize opportunity costs from under-investment or losses due to over-investment. This, in turn, depends on the accurate representation of securities data sourced from data vendors into the World Bank's internal systems.

A common challenge identified with vendor-sourced data is that it can be incomplete or incorrect. An incorrect cash forecast can result in the portfolio being over-invested by the trading desk, causing the account to go into overdraft.

Given the unreliability of the issuance terms sourced from external vendors, the World Bank Treasury decided to take the information directly from the security terms provided by issuers.

Photo: Adobe Stock by Din Nasahrudin - Generated with AI

Manually reading the terms from issuer Final Terms documents for hundreds of securities, identifying key data elements, and manually comparing these across systems would be a challenge. This task alone would take at least an hour per bond, making it impractical to process each term manually. To address this and find a scalable solution, the World Bank evaluated emerging technologies to automate the extraction and reconciliation of essential bond term data.

Project Objectives

- Strengthen cash forecasting using an AI-driven tool to extract data from issuer Final Terms documents and identify discrepancies for enhanced cash management.
- Mitigate data errors and reduce operational risk from data discrepancies.
- Use a scalable approach so the model can be adapted to any document type by labeling and fine-tuning extraction tasks.

Solution

Leveraging the Bond Data Taxonomy created by the International Capital Markets Association (ICMA), the World Bank Treasury developed an extractive AI model using Document Intelligence from Microsoft's Azure Cognitive Studio.

The model was trained with a diverse set of security types by labeling key words that affect interest calculations and payment schedules.

Each training session allowed the model to learn directly from examples where each word in the document was specifically associated with a label. This training approach was ideal as it learned directly from associations between context and answers.

The extractive AI model has been integrated into a web application featuring an intuitive user interface. The application allows a human-in-the-loop to interact with the document, for additional validation as needed. The interface enables users to compare the extracted data with the sourced data from external vendors and natively provides numerical confidence scores for each record, which directly measures the model extraction quality.

The model, trained on over 150 final terms from a diverse range of issuers, currencies, and security types, has consistently demonstrated robust performance by identifying multiple discrepancies.

Benefits

Streamlined data accuracy workflow: ASTRA has significantly reduced the time required for reconciling and analyzing data from issuer Final Terms, cutting it down from an hour to under one minute per document. This significant decrease in processing time allows for a more reliable workflow process for managing securities data and overall cash projections.

Improved transparency and efficiency: The AI extractive model reduces operational risk, eliminates manual reconciliation and enhances financial data reliability. It ensures accurate cash projections, minimizing the risks of over-investments and under-investments. This approach underscores the importance of leveraging technology to address data quality challenges and mitigate financial risks in asset management operations.

Significant Savings Potential: The model can effectively address data discrepancies substantially reducing risks. ASTRA also integrates AI with human expertise, generating daily savings and mitigating financial risks in cash management. To illustrate, consider a hypothetical scenario involving a data error in the payment calendar for a single US$100 million trade, it might cause an investor to expect repayment one day earlier than the actual maturity date. With an interest rate of 8.5%, this discrepancy could lead to an overdraft cost of up to US$23,500.

Scalability: The solution addresses a key challenge faced by investors active in fixed income securities. The World Bank Treasury has shared its experience from the project with other financial market participants at various industry events and conferences.

The Way Forward

The World Bank Treasury has been a pioneer in the development of innovative financial products. Its issuance of digital bonds, including most recently on the Euroclear and Swiss Digital Exchange platforms, demonstrates the potential of blockchain technology to digitalize capital markets.

This deployment of artificial intelligence tools is the latest example of leveraging technology to further enhance the accuracy and efficiency of data in the capital markets and asset management business.

Innovation Summary

Technology	Extractive Artificial Intelligence
Platform	Microsoft Azure Document Intelligence
Function	Intelligent data extraction and automated reconciliation
Application	World Bank asset management transactions
Standardization	ICMA Bond Data Taxonomy to reconcile extracted data with external sources
Outcome	Precision cash planning