HKEX
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A RegTech AI Case Study:

Assessing the Annual Reports of Listed Companies

HKEX Business Need

There are more than 2,500 companies listed on the Stock Exchange of Hong Kong, and each issuer is required to publish an Annual Report that presents their financial results, business performance and management commentary to the general public.

As the frontline regulator, Hong Kong Exchanges and Clearing Limited (HKEX) monitors these reports to check that the issuers are disclosing relevant information that the Listing Rules of the Stock Exchange require of them. Historically, this has been done only on a thematic basis focusing on major topics.

With an interest in monitoring companies' compliance with all the Listing Rules disclosure requirements, we required a solution that would promote better disclosure, completeness and access for both shareholders and the general public, while improving operational efficiency.

Our Approach

In the HKEX Group Strategic Plan 2019-2021 we expressed an aspiration to leverage technology to modernise our core functions in delivering greater efficiency. We therefore sought a way to use artificial intelligence (AI) to address this need.

Automating the process of detecting the relevant disclosures, checking their consistency with the issuer's other communications (such as announcements and circulars), and ultimately assessing their compliance with the Listing Rules could improve the usefulness of issuers' published materials and transparency for investors and regulators.

In late 2018, HKEX began collaborating with Beijing Paoding Technology Co. Ltd. (PAI Tech) to find an AI solution to this challenge. PAI Tech is a pioneer in the field of document intelligence, with a strong background in the financial industry and a focus on regulatory technology.

Can a Machine Understand an Annual Report?

Our greatest challenge was that annual reports are unstructured, richly formatted documents. In addition to natural language arranged in sections and paragraphs, they also contain captions, footnotes, tables and charts. Perceptive AI alone is not sufficient to create the inference and specific semantic understanding required in order to properly assess issuers' compliance with various Listing Rules.

While AI is widely used by the finance industry to detect simple pieces of information such as earnings per share and interest rates inside similar documents, our goal of finding and evaluating more than one hundred types of regulatory disclosure within each annual report posed a formidable challenge.

The required data is often scattered across multiple pages of an annual report, and in some cases the data is incomplete and requires retrieving and analysing other supplementary documents, such as announcements made by the issuer during the year.

Secondly, distinct AI models needed to be built for every Listing Rule, each requiring large sets of training data. Finally, the sheer diversity of the training set was remarkable. No two annual reports are the same.
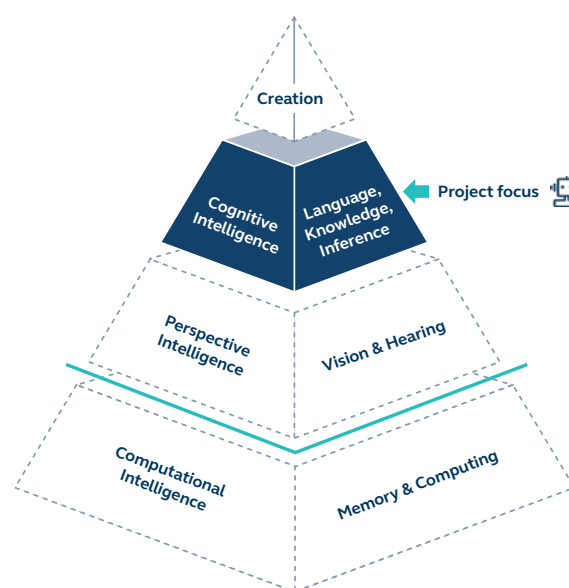
Innovative Solution

HKEX and PAI Tech collaborated to apply a combination of natural language processing (NLP) and deep learning techniques, developing a comprehensive ability to read, understand and interpret the elements of an annual report. This is collectively referred to as Document Intelligence, and requires processing large sets of training data.

The resulting system downloads annual reports and supplementary announcements, locates disclosures within the content corresponding to each Listing Rule, and then deduces whether issuers are compliant. It then retains the assessment and compliance analysis.

> We used more than 3,800 English language annual reports and more than 400 items of corporate communication to train the system to assess 140 different types of corporate disclosure and compliance.

Efficiency and Transparency

The resulting platform has boosted the breadth and efficiency of annual report assessment, and in 2020 it became part of HKEX's regulatory toolkit. Through AI-suggested disclosure location and compliance assessment, HKEX can cover review of all required disclosure in the annual reports.

The platform's performance has steadily increased during the development of the model. Overall efficiency rates for location of annual report disclosures and issuer compliance recommendations for the training set reached 90% and 92% respectively. We then tested the model against 50 previously unseen reports and the efficiency rates were 84% and 85% respectively. We hope to continuously improve the efficiency through regular review of data generated from user verification.

HKEX will continue to use the help of AI in targeted ways to improve efficiency in vetting and monitoring. Future areas of research include extending the platform to results announcements and other types of regular corporate communications.

Against the backdrop of accelerating technological innovation in the financial industry, HKEX will continue to focus on applying new technologies to modernise its core functions in order to enable greater operational efficiency. HKEX's ambition to be a globally trusted and innovative organisation is matched by its commitment to deliver the highest standards of integrity and transparency to the markets and communities it serves.

Watch this video for more information on how HKEX uses technology to transform the listing processes.

HKEX was awarded Outstanding Project –
Financial Document Analysis by the Regulation Asia Awards for Excellence 2020 for this innovative new platform.

For more information about HKEX please visit www.hkexgroup.com.
Please read the full technical report of this project **here**.