



Artificial intelligence in a regulatory setting: Assessing listed companies' Annual Reports

A technical report jointly published
by HKEX and PAI Tech

September 2020



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Section 1: Project background



Embracing AI in a regulatory setting

Assessing the Annual Reports of listed companies

The initial public offering (IPO) market in Hong Kong is consistently one of the most active in the world. The number of companies listed on the Stock Exchange of Hong Kong (issuers) has more than tripled over the past 20 years, reaching 2,507 as at the end of July 2020.

Every year, all issuers must 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**) pays close attention to the content of Annual Reports, monitoring them to check, among other things, that the issuers are disclosing all the relevant information that the Listing Rules of the Stock Exchange require of them.

HKEX has long been interested in using artificial intelligence (AI) to help it review Annual Reports. 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 can help improve the quality of issuers' published materials and transparency for the investing public.

In late 2018, HKEX began collaborating with Beijing Paoding Technology Co. Ltd. (**PAI Tech**) to test the power of AI in this context. The resulting platform, co-developed and trained with thousands of Annual Reports, has been a success. It has boosted the breadth, speed and accuracy of Annual Report assessment. Starting from 2020, this platform has become a key part of HKEX's regulatory toolkit.

HKEX will continue this initiative with a long term view to promote better disclosure quality, completeness and access for both shareholders and the general public. As AI models continue to improve with more data over time, HKEX is also exploring how it can apply similarly effective solutions to other areas of its regulatory practice.

The purpose of this technical report is to share the methodology that we used to “train” AI to read and understand Annual Reports: documents that are voluminous, diverse and highly unstructured. We present our lessons learnt, in the hope that sharing this knowledge with fellow regulators, RegTech practitioners and other stakeholders helps advance the use of AI in capital markets.



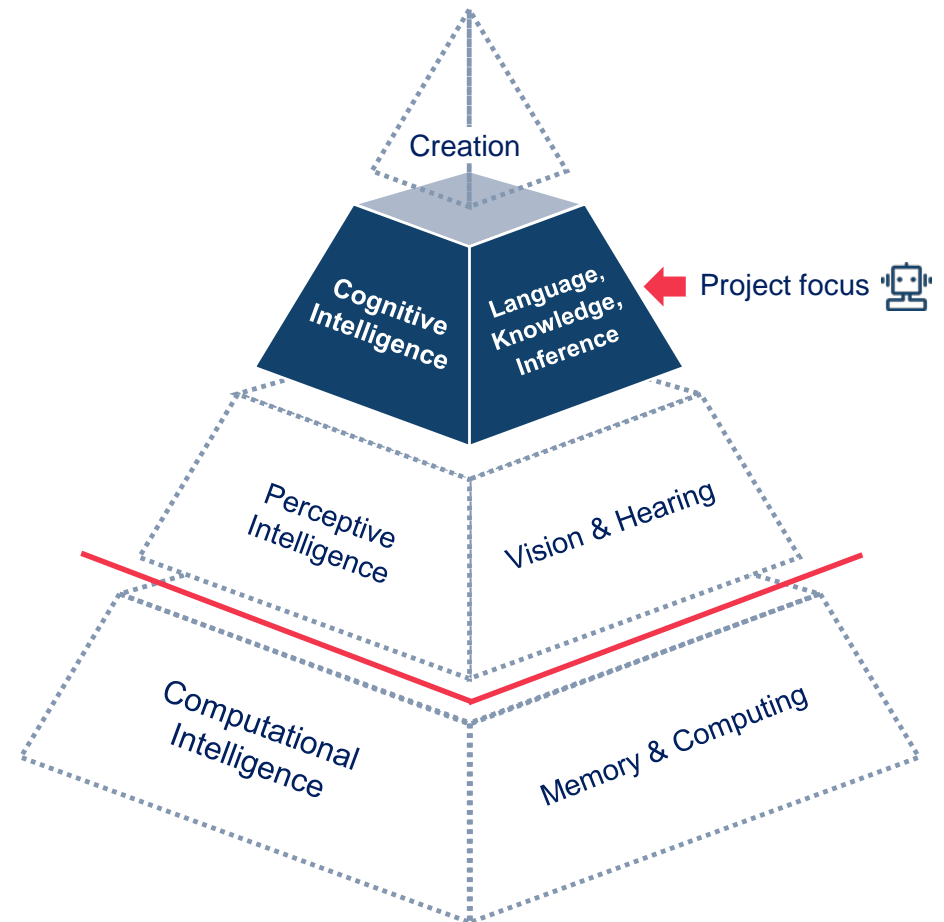
Building 'Document Intelligence'

Can a machine understand an Annual Report?

Annual Reports are unstructured, richly formatted documents. While mostly comprising natural language arranged in neat sections and paragraphs, they also contain numerous other elements: descriptive text (e.g. captions, footnotes), tables and charts, which combine to convey valuable information to the reader.

Though all of this information is electronically stored and identifiable, perceptive AI alone is not sufficient to create the inference and context-specific semantic understanding that we require in order to properly assess issuers' compliance with various Listing Rules.

We therefore apply a combination of natural language processing (NLP) and deep learning techniques, developing a comprehensive ability to 'read', 'understand' and 'interpret' all of the elements of an Annual Report. This is collectively referred to as 'Document Intelligence', and requires cruching through large sets of training data.



Building 'Document Intelligence'



The challenges of our use case

While many financial institutions have successfully trained AI algorithms to detect simple pieces of information inside similar documents (e.g. earnings per share, publication date, interest rate...), our goal of finding and then evaluating 100+ types of regulatory disclosures inside Annual Reports posed some formidable challenges.

Firstly, the information relevant to each Listing Rule is often scattered across different pages of an Annual Report, which must be successfully identified as related to one another. Even then, the data (or lack thereof) may be insufficient to complete a full assessment, which means retrieving and analysing other supplementary documents (e.g. announcements made by the issuer during the year) without any human intervention.

Secondly, distinct AI models needed to be built for every Listing Rule, each requiring large sets of training data. Some Listing Rules concern events and circumstances that are simply too historically rare to have a sufficient training set for meaningful AI models to be constructed, and therefore had to be excluded from the final scope of the platform.

Finally, the sheer diversity of the training set is remarkable. No two Annual Reports are the same, and with 183 new company listings in Hong Kong in 2019 alone, the variety of documents that the AI algorithm is expected to perform highly on going forward is ever-expanding.



Section 2: Our methodology



Solution Framework

3-Step Solution	Purpose	Framework
STEP 1: Recognise document structure	Recognise different document elements (e.g. paragraphs, charts, tables, pictures) in Annual Reports and other relevant corporate communications	AI models are built based on deep learning to recognise reading sequence and logical document hierarchy to understand different document elements
STEP 2: Locate the right disclosures	Locate (1) disclosures within Annual Reports and (2) confirmatory texts from relevant corporate communications with respect to Listing Rules	Various AI models are built for different Listing Rules. The resulting models extract fine-grained information in recognised document elements, e.g. a sub-string of text in a paragraph, a numerical value from a table or chart
	If disclosures are present, analyse the content using semantic understanding; suggest “no disclosure” if the information located is deemed irrelevant	Trained AI models will differentiate between negative and positive statements if disclosures are located; and suggest “no disclosure” if disclosures located are below a certain confidence interval
STEP 3: Recommend a compliance assessment	Using analysis from Step 2, deduce whether issuers are likely to be compliant with respect to each relevant Listing Rule, and make a recommendation	Based on semantic understanding developed from Step 2, a logic judgment function $g(S)$ is developed to recommend a compliance assessment, using both AI models and rules based on actual review process

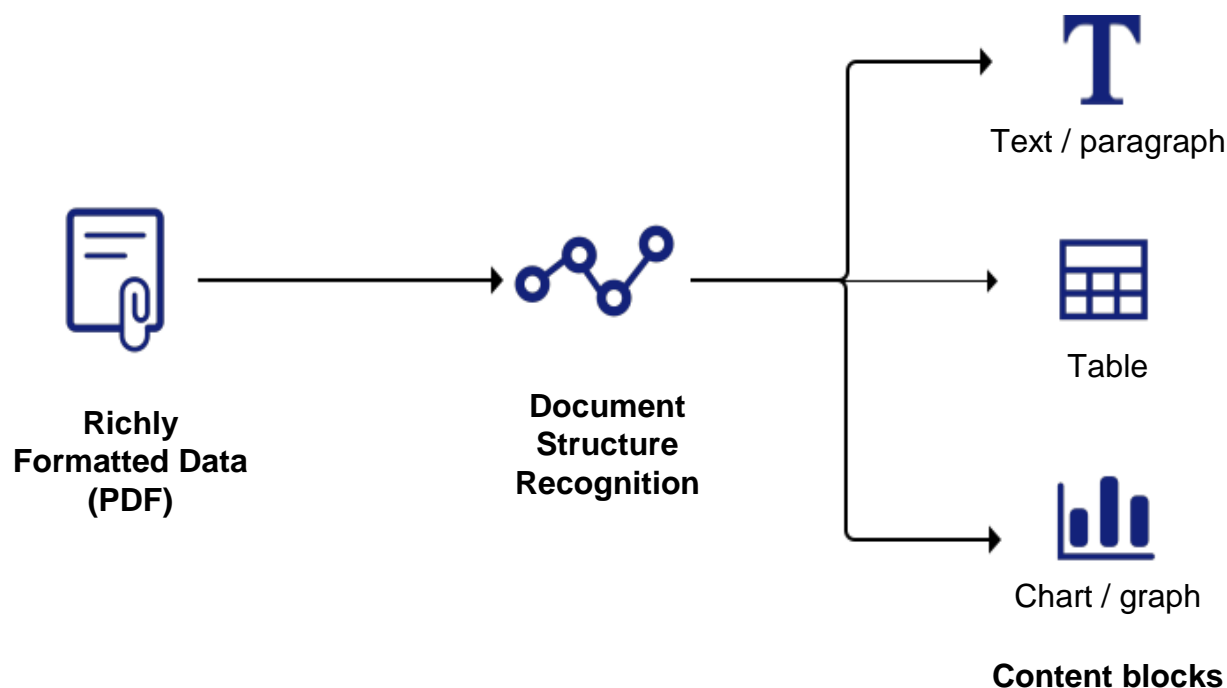


Step 1: Recognise document structure

The PDF Annual Reports store the visual information of the pages instead of their structural information, and only the latter can be analysed for review. As previously mentioned, very specific locations within Annual Reports and corporate communications must be reviewed with respect to each Listing Rule. They can range from a number or text to an entire table or graph (for some Listing Rules, it can be both). Before a location can be found, the nature of each document element has to first be determined. This is done by parsing all PDF Annual Reports to produce a series of content blocks.

This is formulated as an “Object Detection” problem – we predict the borders of all content blocks in the pages, categorise the logical relationships among them (e.g. matching charts / graphs to paragraphs / texts), determine the correct reading order and establish subsequent document hierarchy.

Information regarding the chapters / sections in which these content blocks are located is also fed to the algorithms for subsequent analysis and model construction in Steps 2 and 3.



Step 1: Recognise document structure

See variable annuity dynamic hedging strategy in the "Risk Management" section of the Company's 2016 M&A for an explanation of the Company's dynamic hedging strategy for its variable annuity product guarantees.

(d) Fair value of derivatives

The pricing models used to value OTC derivatives are based on market standard valuation methodologies and the inputs to these models are consistent with what a market participant would use when pricing the instruments. Derivative valuations can be affected by changes in interest rates, currency exchange rates, forward interest rates, credit spreads, default risk (including the counterparties to the contracts), and market volatility. The significant inputs to the pricing models for most OTC derivatives are inputs that are observable or can be corroborated by observable market data and are classified as Level 2 inputs that are observable generally include interest rates, foreign currency exchange rates and interest rate curves. However, certain OTC derivatives may rely on inputs that are significant to the fair value that are not observable in the market or cannot be derived principally from, or corroborated by, observable market data and these derivatives are classified as Level 3 inputs that are unobservable generally include broker quotes, volatilities and inputs that are outside of the observable portion of the interest rate curve or other relevant market measures. These unobservable inputs may involve significant management judgment or estimation. Even though unobservable, these inputs are based on assumptions deemed appropriate given the circumstances and consistent with what market participants would use when pricing such instruments. The Company's use of unobservable inputs is limited and the impact on derivative fair values does not represent a material amount as evidenced by the limited amount of Level 3 derivatives. The credit risk of both the counterparty and the Company are considered in determining the fair value for all OTC derivatives after taking into account the effects of netting agreements and collateral arrangements.

The gross notional amount and the fair value of derivative contracts by the underlying risk exposure for derivatives in qualifying hedging and derivatives not designated in qualifying hedging relationships are summarized in the following table:

As at December 31,

Type of hedge	2016		2015		2014	
	Notional amount	Fair value	Notional amount	Fair value	Notional amount	Fair value
Qualifying hedge accounting relationships						
Interest rate swaps	\$ 2,104	\$ -	\$ 477	\$ 2,227	\$ 1	\$ 153
Foreign currency swaps	81	\$ -	35	\$ -	1	\$ -
Equity forward contracts	1,200	\$ -	467	\$ -	476	\$ -
Equity forward contracts	100	\$ -	21	\$ -	41	\$ -
Equity forward contracts	100	\$ -	21	\$ -	41	\$ -
Total derivatives in qualifying hedge accounting relationships	3,585	\$ -	981	\$ 2,227	2	\$ 153
Derivatives not designated in qualifying hedge accounting relationships						
Interest rate swaps	201,300	21,300	10,870	213,230	22,771	11,301
Interest rate futures	11,400	236	236	1,801	236	-
Interest rate futures	10,200	147	1,400	9,242	277	1,769
Interest rate futures	1,100	140	140	11,200	120	241
Forward contracts	14,400	140	140	11,200	140	140
Equity forward contracts	14,400	140	140	11,200	140	140
Equity forward contracts	14,400	140	140	11,200	140	140
Total derivatives not designated in qualifying hedge accounting relationships	246,800	21,616	12,386	246,800	24,771	13,451
Total derivatives	\$ 305,100	\$ 21,616	\$ 13,367	\$ 249,030	\$ 24,773	\$ 13,604

Fair value of derivative instruments is summarized by term to maturity in the following tables. Fair values shown do not incorporate the impact of master netting agreements. Refer to note 15.

As at December 31, 2016

Derivative assets	Term to maturity		Total
	Less than 1 year	1 to 5 years	
Derivative assets	\$ 467	\$ 1,769	\$ 2,236
Derivative liabilities	\$ 100	\$ 100	\$ 200

As at December 31, 2015

Derivative assets	Term to maturity		Total
	Less than 1 year	1 to 5 years	
Derivative assets	\$ 140	\$ 1,400	\$ 1,540
Derivative liabilities	\$ 140	\$ 140	\$ 280

Rendered document page

Recognition based on deep learning

```
BT
0.0503 Tc
8.503556008.52503.2795688.92Tm
/Tc2 1Tf
[(t)16 (y)21(p)17(e)39(o)16 (f)29 (
)28(h)28(e)17(d)24 (g)28(e)24(j)TJ
0 Tc
ET
...

Q
q
46.91952776.52 m
242.04 776.52i
242.04 729.96i
144.48729.96146.91952 729.961
H
...
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Draw "at(503,688)in8.5 point font in color black
Draw "y"at...
Draw "p"at...
Draw "e"at...
Draw "o"at...
Draw "f" at...
...
Draw green line segment from (46,776) to (242,776)
Draw green line segment from (242,776) to (242,729)
...

Stored as characters and their positions and formats

See variable annuity dynamic hedging strategy in the "Risk Management" section of the Company's 2016 M&A for an explanation of the Company's dynamic hedging strategy for its variable annuity product guarantees.

(d) Fair value of derivatives

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Derivative assets	\$ 140	\$ 1,400	\$ 1,540
Derivative liabilities	\$ 140	\$ 140	\$ 280

Recognise the paragraphs and tables

```
> columns: [...]
> pages: [...]
> tables: [...]
> 0: [...]
> 1: [...]
> 2: [...]
> paragraphs:
> 0:
> outline: [...]
> outline_score: 0
> type: "PARAGRAPH_2"
> position: [...]
> outline_parsed_by: "model"
> index: [...]
> chars: [...]
> full: "See variable annuity dynamic product guarantees."
> page_idx: 0
> page: 0
> continued: false
> page_merged_paragraph: null
> english_chars: [...]
> chinese_chars: []
> other_chars: []
> syllabus: -1
> 1: [...]
> 2: [...]
> 3: [...]
> 4: [...]
> page_footers: [...]
```

Stored as the document structure



Step 2: Locate the right disclosures

2.1 Locating paragraphs, tables and / or charts

In Step 2, AI models are constructed using inputs from Step 1 to locate the relevant disclosures with respect to each of the ‘trained’ Listing Rules.

Referencing many sets of tagged training data, deep learning models calculate the relevance of a content block to a specific Listing Rule by analysing the embedded semantic information. The tagged data is considered a positive example and the remaining content blocks negative examples. A classification model is trained against the examples tagged, producing output as the conditional probability $P(Y=\text{relevant} \mid \text{content block})$, where an irrelevant element block is given a “0” score and a correctly labelled relevant block “1”. All the content blocks have their own probabilities and are then ranked by scores.

The algorithms consider the chapters / sections a content block belongs in and neighbouring content blocks, among other factors, when calculating the conditional probabilities. In some cases, it also involves keywords analysis against pre-existing open-source financial dictionaries, and bespoke knowledge + rules developed based on HKEX’s review processes. This is possible given that the understanding of financial information and compliance review make use of relatively specialised domain knowledge.

CORPORATE GOVERNANCE REPORT

During the year ended 31st March, 2016, four AGM Board meetings and the 2015 annual general meeting (AGM) were held with an average attendance rate of 100% and 77% respectively, details of which are presented below:

Board Members	Board Meetings	2015 AGM	
董事會成員	董事會會議	二零一五年股東週年大會	
Executive Directors			
Mr. Lam Siu-ting, Chairman of the Board	林少雄先生 (董事會主席)	4/8	✓
Mr. Tai Tin-shi, Angus	戴廷志先生	4/8	✓
Mr. Cheung Chi-shing, Charles	鄭志成先生	4/8	✓
Non-Executive Director			
Mr. Young Chee	楊祥麟先生	4/8	—
Independent Non-Executive Directors			
Mr. Chan Yau-ting, Michael	陳耀庭先生	4/8	✓
Mr. Kwok Lam-hing, Larry, M.P.	郭禮庭, 麥美琴, M.P.	4/8	✓
Mr. Tam Yung-chung, Kenny	譚永昌先生	4/8	✓

Early meeting schedule is discussed and approved by the Board at the beginning of the year. Board agenda is approved by the Chairman following consultation with other Board members. Board agenda and meeting materials are dispatched to all Board members in a timely manner.

All Directors have access to the Company Secretary who is responsible for ensuring that Board procedures are complied with and advises the Board on corporate governance and compliance matters. They are also encouraged to take independent professional advice at the Company's expense in performance of their duties. If necessary, furthermore, all the Directors are covered by the Directors' & Officers' (D&O) liability insurance, which is also part of our best practices.

截至二零一六年三月三十一日止年度內，本公司舉行四次股東週年大會及二零一五年股東週年大會，出席率分別為100%及77%，詳情如下：

Board Meetings	2015 AGM	
董事會會議	二零一五年股東週年大會	
Executive Directors		
Mr. Lam Siu-ting, Chairman of the Board	林少雄先生 (董事會主席)	4/8
Mr. Tai Tin-shi, Angus	戴廷志先生	4/8
Mr. Cheung Chi-shing, Charles	鄭志成先生	4/8
Non-Executive Director		
Mr. Young Chee	楊祥麟先生	4/8
Independent Non-Executive Directors		
Mr. Chan Yau-ting, Michael	陳耀庭先生	4/8
Mr. Kwok Lam-hing, Larry, M.P.	郭禮庭, 麥美琴, M.P.	4/8
Mr. Tam Yung-chung, Kenny	譚永昌先生	4/8

於年度開始時安排討論及批准年初的會議日程表。於年度開始時由主席在諮詢其他董事會成員後，經討論及批准後，所有董事會會議的日期、經討論及批准後，所有董事會會議的日期、經討論及批准後，所有董事會會議的日期。

所有董事均可向公司秘書查詢，因為公司秘書負責確保董事會程序得到遵守，並向董事會提供有關公司管治及合規事項的建議。他們亦被鼓勵在履行其職責時，如需要，可尋求獨立專業意見，費用由本公司支付。此外，所有董事及高級人員均獲董事及高級人員責任保險所保障，有關安排亦屬於本公司最佳實踐的一部分。

It's here!

Paragraph location

- 0.6582 1. For the year ended Dece...
- 0.0145 2. 6.1 Major Customers
- 0.0050 3. During the Reporting Peri...
- 0.0049 4. The Group has no major s...
- 0.0024 5. The Group is always conc...



Step 2: Locate the right disclosures

2.1 Locating paragraphs, tables and / or charts

Example:

App16.9: A listed issuer shall include in its financial statements the name of every subsidiary, its principal country of operation and its country of incorporation or other establishment, and, in the case of a subsidiary established in the PRC, the kind of legal entity it is registered as under PRC law (such as a contractual or cooperative joint venture); and (2) particulars of the issued share capital and debt securities of every subsidiary.

Issuers opt to disclose various details using different formats in paragraphs (including footnotes), tables and / or charts.

Name	Principal activities	Country of business/ incorporation	Form of legal entity	Date of incorporation	Issued and paid up capital	Effective interest held by the Company
Directly held by the Company						
	Investment holding	BM	Limited liability company	18 July 2017	US\$1	100%
	Investment holding	BM	Limited liability company	5 July 2016	US\$1	100%
Indirectly held by the Company						
	Investment holding	HK	Limited liability company	11 August 2017	HK\$1	100%
	Investment holding	HK	Limited liability company	30 June 2016	HK\$1	100%
	Investment holding	PRC	Limited liability company	9 December 2017	RMB1,000,000	100%

The PRC	N/A	—	100%	Provision of construction and related services
<p>The above list contains the particulars of subsidiaries which, in the opinion of the Directors, principally affected the results of the year or formed a substantial portion of the net assets of the Group. To give details of other subsidiaries would, in the opinion of the Directors, result in particulars of excessive length.</p> <p>As at 31 December 2019, the bank and cash balances of the Group's subsidiaries in the PRC denominated in RMB amounted to RMB193,946,000 (2018: RMB262,704,000). Conversion of RMB into foreign currencies is subject to the PRC's Foreign Exchange Control Regulations and Administration of Settlement, Sale and Payment of Foreign Exchange Regulations.</p> <p># These subsidiaries are registered in the PRC with limited liability.</p>				
<p>being a wholly-owned subsidiary of enterprise, directly holds 99% of the registered capital of investment directly hold 98.73% and 1.27% of the registered capital of and a wholly foreign-owned and respectively.</p> <p>is the core operating entity of the Group during the two years ended 31 December 2019 and 2018.</p>				



Step 2: Locate the right disclosures

2.2 Locating specific fine-grained information

For a small number of Listing Rules, the simple location of paragraphs, tables and / or charts is sufficient for determining issuers' compliance. For these cases, disclosures are considered mandatory and issuer compliance is automatically implied if certain disclosures are present, and vice versa.

However, more often than not, with regard to most Listing Rules specific texts and / or numbers have to be extracted for consistency to be established against other parts of the Annual Report and / or other relevant corporate communications. Compliance cannot be determined based on the simple fact that certain disclosures are there – *it depends*.

For the years end **December 31, 2015** and **December 31, 2016**, we had **prepayment** and **other payables** in an aggregate amount of approximately **\$1,890 million** and **\$1,743 million**, which constituted **93.88%** and **93.14%** of **current liabilities**, respectively.



Dec 31, 2015 prepayment	+	Dec 31, 2015 other payables	=	\$1,890 million
Dec 31, 2016 prepayment	+	Dec 31, 2016 other payables	=	\$1,743 million
$\left(\begin{array}{cc} \text{Dec 31, 2015} & + \\ \text{prepayment} & \text{other payables} \end{array} \right) \div$				$\frac{\text{Dec 31, 2015}}{\text{current liabilities}} = 93.88\%$
$\left(\begin{array}{cc} \text{Dec 31, 2016} & + \\ \text{prepayment} & \text{other payables} \end{array} \right) \div$				$\frac{\text{Dec 31, 2016}}{\text{current liabilities}} = 93.14\%$

For these conditional cases, fine-grained information has to be extracted and logical relationships established among different parts of the documents, just as how humans would comprehend information.

The same methodology from 2.1 is repeated with regard to respective paragraphs, tables and / or charts extracted to identify embedded fine-grained information. The NLP models make use of relationship extraction and event detection and characterisation to locate causal relationships, multivariate events, and complex language phrasing. Oftentimes, no set keywords are available in these cases.

For some Listing Rules, a mix of paragraphs, charts and / or tables are used, creating an added layer of complications – the models were further adjusted for these cases.



Step 2: Locate the right disclosures

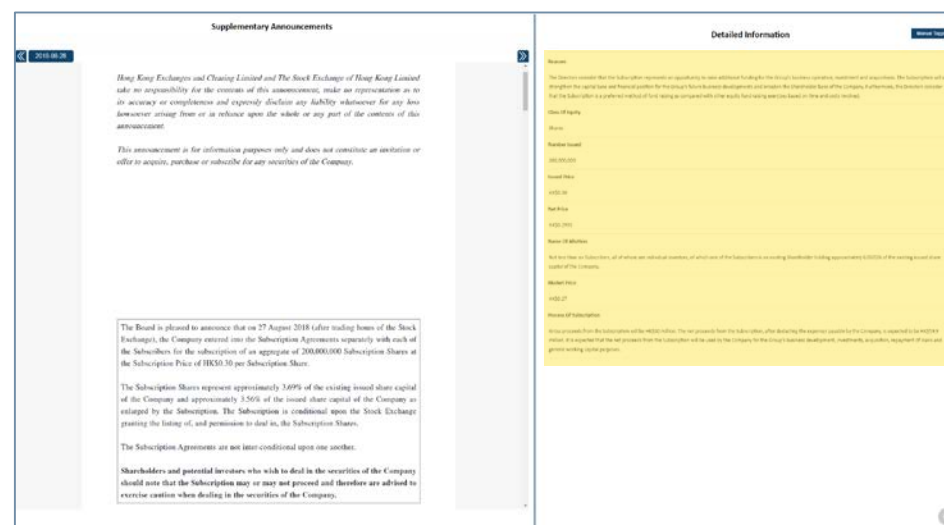
2.2 Locating specific fine-grained information

Example:

App16.11(3): In the case of any issue for cash of equity securities (including securities convertible into equity securities), a listed issuer shall disclose, among other details, as respect each class of equity securities, the number issued, their aggregate nominal value, if any.

The model extracts information from the Annual Report, stating that “[o]n 27 August 2018, the Company entered into the subscription agreements separately with each of the six independent subscribers for the subscription of an aggregate of **200,000,000 subscription shares** at the subscription price of **HK\$0.30** per subscription share (“Subscription”). The closing market price was **HK\$0.27** per share at the date of the subscription agreements.”

Using the date extracted, the model looks for various announcements around that time, locating “Subscription of New Shares under General Mandate” the issuer published under the headline “Issue of Shares under a General Mandate” on 28 August 2018. Various attributes listed on the right are automatically extracted from the announcement for confirmation of consistency to determine compliance.



Step 2: Locate the right disclosures

2.2 Locating specific fine-grained information

Example:

Ch17.07(1): Disclosure regarding the movement of outstanding share options, including particulars of outstanding options at the beginning and at the end of the financial year/period, including number of options, date of grant, vesting period, exercise period and exercise price.

Each of the specific attributes, e.g. exercise price, is extracted to be compared against the information extracted by the issuer's Monthly Returns issued during the year for compliance assessment to be made.

Share Options (under Share Option Schemes of the Issuer)						No. of new shares of issuer issued during the month pursuant thereto	No. of new shares of issuer which may be issued pursuant thereto as at close of the month		
Particulars of share option scheme including EGM approval date (dd/mm/yyyy) and class of shares issuable	Movement during the month				1. Share Option Scheme adopted				
	Granted	Exercised	Cancelled	Lapsed					
Notes to the table of outstanding share options granted under the 2007 Scheme during the Year:									
年內根據二零零七年計劃已授出但未行使之購股權列表附註：									
(a)	The vesting period of the share options is from the date of grant until the commencement of the exercise period.							(a)	購股權之歸屬期為由授出日期起直至行使期開始為止。
(b)	The exercise price of the share options is subject to adjustment in case of rights or bonus issues, or other similar changes in the Company's share capital.							(b)	在供股或發行紅股或本公司股本出現其他類似變動之情況下，購股權之行使價須作出調整。

Name or category of participant 參與者姓名或類別	Number of share options 購股權數目					At 31 December 2018 十二月三十一日	Date of grant of share options ¹ 購股權授出日期 ¹	Exercise period of share options ² 購股權行使期 ²	Exercise price of share options ³ 購股權行使價 ³ HK\$ per share 每股港元
	At 1 January 2018 於二零一八年一月一日	Granted during the Year 年內授出	Exercised during the Year 年內行使	Cancelled during the Year 年內註銷	Lapsed during the Year 年內失效				
Ex-directors ⁴ 前董事 ⁴									
.....	10,000,000	-	-	-	(10,000,000)	-	24.07.15	24.07.15 - 23.07.18	1.030
	5,000,000	-	-	-	(5,000,000)	-	24.07.15	24.07.16 - 23.07.18	1.030
	5,000,000	-	-	-	(5,000,000)	-	24.07.15	24.07.17 - 23.07.18	1.030
	300,000	-	-	-	(300,000)	-	14.10.16	01.07.17 - 13.10.19	0.436
	300,000	-	-	-	(300,000)	-	14.10.16	14.10.17 - 13.10.19	0.436
	400,000	-	-	-	(400,000)	-	14.10.16	14.10.18 - 13.10.19	0.436
	21,000,000	-	-	-	(21,000,000)	-			
	3,000,000	-	-	-	(3,000,000)	-	14.10.16	01.07.17 - 13.10.19	0.436
	3,000,000	-	-	-	(3,000,000)	-	14.10.16	14.10.17 - 13.10.19	0.436
	4,000,000	-	-	-	(4,000,000)	-	14.10.16	14.10.18 - 13.10.19	0.436
	10,000,000	-	-	-	(10,000,000)	-			
	500,000	-	-	-	(500,000)	-	24.07.15	24.07.15 - 23.07.18	1.030
	250,000	-	-	-	(250,000)	-	24.07.15	24.07.16 - 23.07.18	1.030
	250,000	-	-	-	(250,000)	-	24.07.15	24.07.17 - 23.07.18	1.030
	300,000	-	-	-	-	300,000	14.10.16	01.07.17 - 13.10.19	0.436
	300,000	-	-	-	-	300,000	14.10.16	14.10.17 - 13.10.19	0.436
	400,000	-	-	-	-	400,000	14.10.16	14.10.18 - 13.10.19	0.436
	2,000,000	-	-	-	(1,000,000)	1,000,000			
	500,000	-	-	-	(500,000)	-	24.07.15	24.07.15 - 23.07.18	1.030
	250,000	-	-	-	(250,000)	-	24.07.15	24.07.16 - 23.07.18	1.030
	250,000	-	-	-	(250,000)	-	24.07.15	24.07.17 - 23.07.18	1.030
	300,000	-	-	-	(300,000)	-	14.10.16	01.07.17 - 13.10.19	0.436
	300,000	-	-	-	(300,000)	-	14.10.16	14.10.17 - 13.10.19	0.436
	400,000	-	-	-	(400,000)	-	14.10.16	14.10.18 - 13.10.19	0.436
	2,000,000	-	-	-	(2,000,000)	-			
	35,000,000	-	-	-	(34,000,000)	1,000,000			

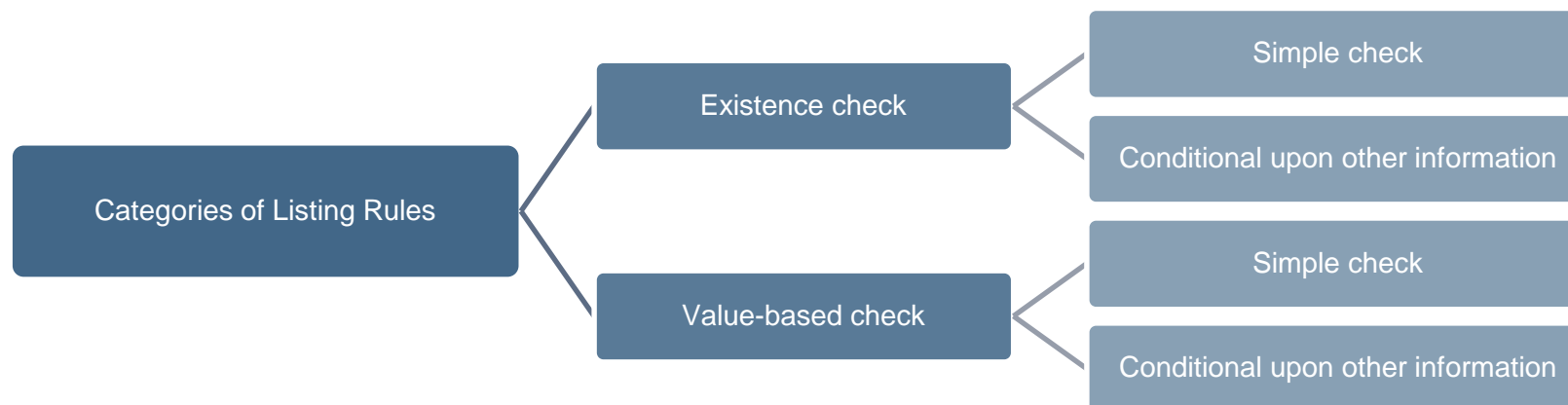


Step 3: Recommend a compliance assessment

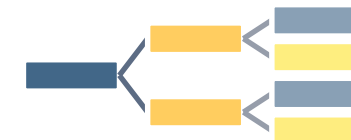
A logic judgment function $g(S)$ was developed to evaluate issuers' compliance, using location inputs S from Step 2 for the Listing Rules within the scope of this project. The function takes into account general conditions, such as whether the disclosures are complete and whether information is consistent across different locations. Specific factors with respect to each Listing Rule are also considered, such as whether the disclosed values meet certain size requirements.

As alluded to previously, assessing compliance can become quite complicated as Listing Rules become more complex. For the purpose of developing the platform, various Listing Rules were put into the following categories.

- **Existence check**
 - *Simple check*: the presence of certain disclosures alone indicates Listing Rule compliance and vice versa.
 - *Conditional upon other information*: compliance cannot be deduced based on the presence or absence of disclosures; confirmatory details have to be extracted from other sources.
- **Value-based check**
 - *Simple check*: Listing Rule compliance is implied if values extracted match set rules and vice versa.
 - *Conditional upon other information*: values from multiple sources are extracted to verify consistency; oftentimes numeric formulae and / or logic are involved.



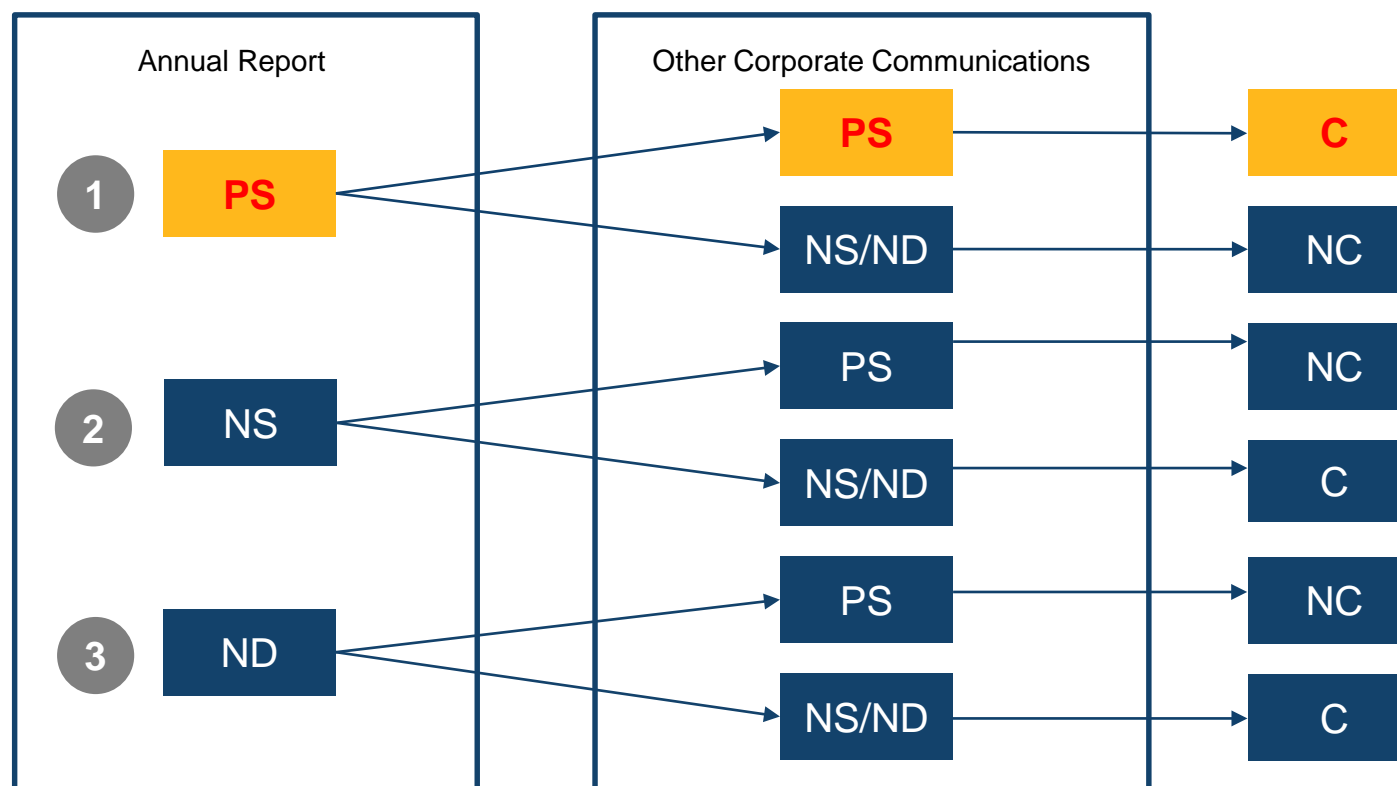
Step 3: Recommend a compliance assessment



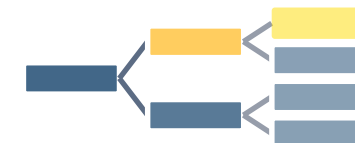
- **Conditional upon other information**

The challenge with Listing Rules that call for confirmatory texts is that non-disclosure does not automatically mean non-compliance. The issuer in question may simply have not contemplated relevant corporate actions, e.g. equity issuance, during the financial year, and hence has nothing to disclose. For this case, as long as the issuer

has not filed relevant corporate communications outside of the Annual Report, the platform will not flag it as a potential non-compliance. Similarly, if an issuer has disclosed certain information within the Annual Report, the issuer is only considered compliant if confirmatory texts can be located and matched to show consistency. If AI considers something to not add up, human reviewers are called into action to confirm. See below a simple logic tree to demonstrate.



Step 3: Recommend a compliance assessment



• Existence check

- *Simple check*: the presence of certain disclosures alone indicates Listing Rule compliance and vice versa; the disclosures can be located in either paragraphs, tables and/or charts

Examples:

Report of the Directors 董事會報告書	
DONATIONS	捐款
Charitable donations made by the Group during the Year amounted to approximately HK\$238,000 (2017: HK\$702,000).	於本年度內，本集團作出慈善捐款約238,000港元(二零一七年：702,000港元)。
PROPERTY, PLANT AND EQUIPMENT	物業、機器及設備
Details of the movements in property, plant and equipment of the Group are set out in Note 6 to the consolidated financial statements.	本集團之物業、機器及設備之變動詳情載於綜合財務報表附註6。
PRINCIPAL PROPERTIES	主要物業
Details of the principal properties held for investment purposes are set out on page 319 of the annual report.	持有投資用途之主要物業詳情載於本年報之第319頁。
SHARE CAPITAL	股本
Details of the movement in share capital of the Company are set out in Note 25 to the consolidated financial statements.	本公司之股本變動詳情載於綜合財務報表附註25。
DISTRIBUTABLE RESERVES/(DEFICIT)	可分派儲備/(虧蝕)
Distributable reserves/(deficit) of the Company as at 30th June 2018 amounted to HK\$(152,025,000) (2017: HK\$79,365,000) including contributed surplus, of HK\$112,429,000 (2017: HK\$112,429,000), which is only distributable subject to conditions as set out in Note 27(c) to the consolidated financial statements.	於二零一八年六月三十日之可分派儲備/(虧蝕)為(152,025,000)港元(二零一七年：79,365,000港元)，包括實收溢利112,429,000港元(二零一七年：112,429,000港元)，而實收溢利只符合綜合財務報表附註27(c)所載各項條件時方可予以分派。
FIVE YEAR FINANCIAL SUMMARY	五年財務摘要
A summary of the results and of the assets and liabilities of the Group for the last five financial years is set out on page 320 of the annual report.	本集團過去五個財政年度之業績、資產及負債之摘要載於本年報之第320頁。
PURCHASE, SALE OR REDEMPTION OF THE COMPANY'S LISTED SECURITIES	購買、出售或贖回本公司之上市證券
The Company has not redeemed any of its shares during the Year. Neither the Company nor any of its subsidiaries has purchased or sold any of the Company's listed securities during the Year.	本公司於本年度並無贖回其任何股份。本公司及其任何附屬公司於本年度概無購買或出售本公司任何上市證券。

← App16.29: A listed issuer shall include a statement of the reserves available for distribution to shareholders by the listed issuer as at the date of its statement of financial position.

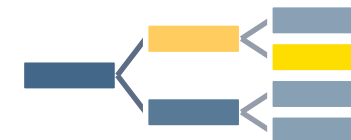
→ App16.22: In relation to loans and borrowings a listed issuer shall provide in its financial statements, except where the listed issuer is a banking company, an analysis as at the date of statement of financial position, firstly of bank loans and overdrafts and, secondly of other borrowings, showing the aggregate amounts repayable

NOTES TO THE FINANCIAL STATEMENTS For the year ended 31 December 2018			
28. ACCRUAL AND OTHER PAYABLES			
		2018	2017
		RMB'000	RMB'000
Accrual		2,381	2,078
Other payables		168,427	338,599
Interest payables		-	25,109
Deferred income		-	5,131
		167,808	370,907
The accrual and other payable mainly represents provision of litigation, security deposit received from the constructors and the provision of warranty.			
29. BANK AND OTHER BORROWINGS			
	Notes	2018	2017
		RMB'000	RMB'000
Secured bank borrowing	a	7,500	29,380
Secured other borrowing	b	6,165	37,612
Unsecured other borrowing	c	282,627	183,614
		296,292	230,606
Less: balance repayable within twelve months (shown under current liabilities)		(13,666)	(45,619)
		282,627	184,987
Notes:			
(a) As at 31 December 2018, the Group's interest bearing bank borrowings of RMB7,500,000 were bearing floating interest rate at 5.2% per annum over HIBOR and secured by the building held by a shareholder of a subsidiary, which is repayable within two years. The remaining bank borrowings were bearing floating interest rate from 6.1% to 6.3% per annum over HIBOR and secured by a building held by a shareholder of a subsidiary, which are repayable within one year.			
(b) As at 31 December 2018, the Group's other borrowings of RMB6,165,000 were bearing fixed interest rate 19.5% per annum and covered by corporate guarantee provided by the Group, which is repayable on demand.			
(c) As at 31 December 2018, the Group's other borrowing from a private company with common shareholder of RMB282,627,000 at fixed interest rate at 6% per annum and repayable after one year.			

Conclusions: both are cases of compliance, as suggested by the AI platform



Step 3: Recommend a compliance assessment



- **Existence check**

- *Conditional upon other information:* compliance cannot be deduced based on simple presence or absence of disclosures; confirmatory details have to be extracted from other sources

Example:

*App16.31(4): A statement of the percentage of revenue from sales of goods or rendering of services attributable to the **largest customer**; disclosure can be omitted in the event that the percentage of revenue from sales of goods or rendering of services attributable to the **5 largest customers** combined is less than 30, but a statement of that fact shall be given.*

Major Customers and Suppliers

During the year ended 31 December 2019, the combined value of the Group's contracts with its five largest suppliers, which were not of a capital nature, was less than 30 per cent of the total value of supplies purchased. The Group's five largest customers combined contributed less than 30 per cent of its total revenue and other income during the year ended 31 December 2019.

MAJOR CUSTOMERS AND SUPPLIERS

For the year ended 31 December 2018, the five largest customers of the Group accounted for approximately 4.23% of the Group's total revenues while the largest customer of the Group accounted for approximately 1.37% of the Group's total revenues. In addition, for the year ended 31 December 2018, the five largest suppliers of the Group accounted for approximately 18.63% of the Group's total purchases while the largest supplier of the Group accounted for approximately 5% of the Group's total purchases.

MAJOR CUSTOMERS AND SUPPLIERS

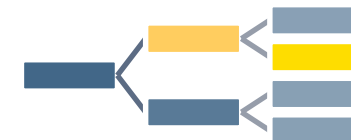
For the year ended 31 December 2018, the five largest customers of the Group accounted for approximately 4.23% of the Group's total revenues while the largest customer of the Group accounted for approximately 1.37% of the Group's total revenues. In addition, for the year ended 31 December 2018, the five largest suppliers of the Group accounted for approximately 18.63% of the Group's total purchases while the largest supplier of the Group accounted for approximately 5% of the Group's total purchases.

Conclusion: the absence of disclosure of the percentage attributable to the largest customer does not automatically mean non-compliance, in this case, the issuer is compliant and the relevant paragraph is identified by AI

Conclusion: in the event that the percentage attributable to the 5 largest customers combined is more than 30, AI identifies and label the aforementioned value together with the percentage attributable to the largest customer. This is an example of fine-grained data extraction and the issuer is labelled compliant



Step 3: Recommend a compliance assessment



- **Existence check**

- *Conditional upon other information:* compliance cannot be deduced based on simple presence or absence of disclosures; confirmatory details have to be extracted from other sources

Example:

App16.11(8)a: With relation to issuance for cash of equity securities, disclose a detailed breakdown and description of the proceeds for each issuance and the purposes for which they are used during the financial year

Information is extracted from the from the Annual Report under “Report of Directors” and compared against texts extracted from the issuer announcements under the category “Issue of Warrants / Issue of Shares under a Specific Mandate” for consistency. The AI model decides whether the two statements are semantically equivalent, and the process can become challenging since natural language descriptions can be very diverse and often reference very specialised domain knowledge.

Conclusion: the AI model is not able to suggest compliance with a high degree of confidence and human review is required to make final deduction

Extracted from Annual Report:

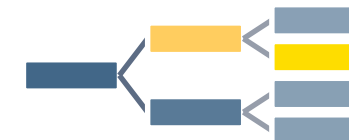
The proceeds from the issue price of unlisted warrants were used to settle expenses incurred in connection with the loan amendment deed.

Extracted from the announcement: “Proposed issue of unlisted warrants under specific mandate”

The proposed issue of unlisted Warrants exceeds 20% of the aggregate number of issued shares as at the date of the Loan Amendment Deed (i.e. the limit specified in Listing Rule 15.02(1)), and is being proposed as a key part of Company’s efforts to manage its cash flow liquidity issue, including in connection with the rescheduling of the Bonds.



Step 3: Recommend a compliance assessment



Existence check

- Conditional upon other information: compliance cannot be deduced based on simple presence or absence of disclosures; confirmatory details have to be extracted from other sources

Example:

App16.32(6): The issuer shall include comments on segmental information. This may cover changes in the industry segment, developments within the segment and their effect on the results of that segment. It may also include changes in the market conditions, new products and services introduced or announced and their impact on the group's performance and changes in revenue and margins.

Ideally, issuers should disclose segmental information in both notes to financial statements and management discussions and analysis or director's reports, and the two should be consistent. However, details extracted under the two oftentimes do not match 100%, with one or more segments left out in either sections. If AI determines that the two parts are more dissimilar than similar, the relevant disclosures will be flagged for human review.

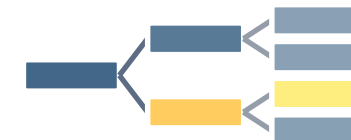
Notes to the Financial Statements 財務報表附註	
31 March 2018 二零一八年三月三十一日	
6. REVENUE AND SEGMENT REPORTING – Continued	6. 收入及分部報告 – 續
<ul style="list-style-type: none"> Consumer electronic products B58 Commercial kitchen products B58 Chinese health products B58 Money lending business B58 Investment in financial instruments B58 	<ul style="list-style-type: none"> 消費類電子產品：消費類電子產品銷售 商用廚房產品：商用廚房產品製造與銷售 中藥保健產品：中藥保健產品銷售 放債業務：提供貸款 投資金融工具：金融工具投資



Chairman's Statement 主席報告	
<p>Consumer Electronic Products <i>Childcare Products</i></p> <p>The market for childcare related products and services is huge and fast growing in China. The National Bureau of Statistics of China indicates that the number of newborn babies will increase by 2.5 million per year because of the effect of the twochild policy. During the Year, the main products of the Group were Haier and Brillante branded small baby appliances (electric sterilizer, baby bottle & food warmer, baby food processor, baby hair cutter, baby air purifier, etc.). The sales of Haier branded baby air purifier was particularly good during the Year.</p> <p>During the Year, the Management continues to deploy the multibrand and multi-product strategy to meet customers' comprehensive needs. So far, we have entered into partnerships with a few world-leading childcare brands, including Bébé Confort and Safety 1st, sub-brands of Danit Group, a global childcare corporation specialising in strollers, car seats, baby travel gears, etc. to serve as their distributor for childcare products in the PRC.</p> <p>On the other hand, we further streamlined the distribution network during the Year. We expect to focus more on large distributors with extensive networks in the future. The streamline of the distribution network facilitates network management and reduces cost in the long run.</p> <p>In addition, we have further enhanced Online to Offline ("O2O") strategy during the Year. Our products are currently available in various e-commerce channels and lots of mother & baby stores in most of the major cities in the PRC.</p> <p>On 29 March 2017, the Company entered into a sale and purchase agreement with an independent third party in relation to the acquisition of the entire issued share capital of Ace Season Holdings Limited ("Ace Season") and the sale loan owed by Ace Season to the vendor on completion at consideration of HK\$85 million (the "Acquisition"). The Acquisition was completed on 30 June 2017. Ace Season and its subsidiaries are principally engaged in the sales of Chinese and other pharmaceutical products, health products, ginseng and dried seafood products to wholesaler and retailer. One of the subsidiaries of Ace Season, Nam Pei Hong Sun Ying Drugs Company Limited engages in the business of trading and retail of "Sun Ying" (參茸) and dried seafood products since 1977 and the brand name of "Nam Pei Hong" (南北行) is highly recognised in Hong Kong and Southern Mainland China.</p>	<p>消費類電子產品 <i>嬰童產品</i></p> <p>中國的嬰童相關產品及服務市場規模龐大，增長迅速。中國國家統計局指出，受到二孩政策影響，新生兒的數量將逐年增加二百五十萬名。於本年度，本集團之主要產品為海爾及貝立安品牌小型嬰童產品（電動消毒器、奶瓶及食物加熱器、嬰童食物調理機、嬰童理髮器、嬰童空氣淨化器等）。於本年度，海爾品牌嬰童空氣淨化器之銷量尤為強勁。</p> <p>於本年度，管理層繼續推行多品牌及多產品策略以滿足客戶的全面需求。迄今為止，我們已與若干世界領先的嬰童品牌（包括Danit集團（一間全球性的嬰童產品公司，專攻嬰兒車、汽車安全座椅及嬰童出行用品等）旗下品牌Bébé Confort及Safety 1st）建立合作夥伴關係，擔任彼等於中國嬰童產品的主要分銷商。</p> <p>另一方面，於本年度，我們進一步精簡分銷網絡。日後，我們預期將更專注發展擁有廣泛網絡的大型分銷商。長期而言，精簡分銷網絡將有助於網絡管理及削減成本。</p> <p>此外，我們已於本年度進一步推進線上到線下（「O2O」）策略。我們的產品目前在眾多的電子商務渠道及中國大陸大部分主要城市的許多嬰童店均有銷售。</p> <p>中藥保健產品</p> <p>於二零一七年三月二十九日，本公司與一名獨立第三方訂立買賣協議，內容有關收購Ace Season Holdings Limited（「Ace Season」）全部已發行股本及完成時Ace Season結欠賣方的出售貸款，代價為八千五百萬港元（「收購事項」）。收購事項已於二零一七年六月三十日完成。Ace Season及其附屬公司主要從事向批發商及零售商銷售中藥及其他藥品、保健品、人參及乾製海產品。Ace Season旗下一間附屬公司南北行參茸藥材有限公司自一九七七年開始即從事參茸及乾製海產品之貿易及零售業務，且「南北行」品牌名稱在香港及中國大陸南方均廣受認可。</p>



Step 3: Recommend a compliance assessment



- **Value-based check**

- *Simple check:* Listing Rule compliance is implied if values extracted match set rules and vice versa

Example:

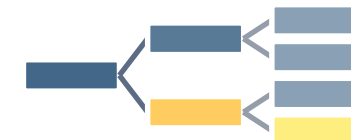
App16.25(6): Five highest paid individuals: an analysis showing the number of individuals whose remuneration fell within bands from HK\$nil up to HK\$1,000,000 or into higher bands (where the higher limit of the band is an exact multiple of HK\$500,000 and the range of the band is HK\$499,999)

The upper limit of each interval is extracted to check if it is a multiple of HK\$500,000.

Conclusion: AI model suggests compliance and nothing was flagged for human review

Hong Kong dollars	US dollars	Number of highest paid employees	Number of senior management
\$7,500,001 – \$8,000,000	\$957,200 – \$1,021,013	—	2
\$8,000,001 – \$9,500,000	\$1,148,540 – \$1,212,453	—	1
\$9,500,001 – \$12,500,000	\$2,807,786 – \$2,871,599	—	1
\$12,500,001 – \$16,000,000	\$3,254,479 – \$3,318,292	—	1
\$16,000,001 – \$20,000,000	\$3,509,732 – \$3,573,545	—	1
\$20,000,001 – \$25,000,000	\$3,573,545 – \$3,637,359	—	1
\$25,000,001 – \$30,000,000	\$3,637,359 – \$3,701,172	—	1
\$30,000,001 – \$35,000,000	\$3,828,799 – \$3,892,612	—	1
\$35,000,001 – \$40,000,000	\$4,211,579 – \$4,275,492	—	1
\$40,000,001 – \$45,000,000	\$4,275,492 – \$4,339,305	—	2
\$45,000,001 – \$50,000,000	\$4,722,185 – \$4,786,998	—	1
\$50,000,001 – \$55,000,000	\$4,786,998 – \$4,849,812	—	1
\$55,000,001 – \$60,000,000	\$5,234,638 – \$5,298,451	—	1
\$60,000,001 – \$65,000,000	\$5,082,265 – \$5,126,078	—	1
\$65,000,001 – \$70,000,000	\$5,700,398 – \$5,764,211	—	1
\$70,000,001 – \$75,000,000	\$5,104,291 – \$5,168,104	1	1
\$75,000,001 – \$80,000,000	\$8,397,577 – \$8,061,490	1	1
\$80,000,001 – \$85,000,000	\$9,444,370 – \$9,508,183	1	1
\$85,000,001 – \$90,000,000	\$14,357,926 – \$14,421,808	1	1
\$90,000,001 – \$95,000,000	\$14,932,315 – \$14,996,128	1	1

Step 3: Recommend a compliance assessment



- **Value-based check**

- *Conditional upon other information:* values from multiple sources are extracted to verify consistency; oftentimes numeric formulae and / or logic are involved

Example:

Ch17.07(2): Particulars of options granted during the financial year/period, including number of options, date of grant, vesting period, exercise period, exercise price and (for options over listed securities) the closing price of the securities immediately before the date on which the options were granted

As part of the review process for this Listing Rule, highlighted values are checked against Monthly Returns of Equity Issuer on Movements in Securities during the financial year; all numbers are then checked against the following formula:

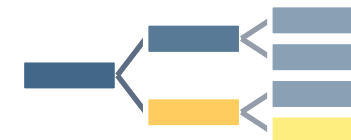
Options outstanding at the end period = options outstanding at the beginning + options granted - options exercised - options cancelled - options lapsed

Conclusion: with regard to the number of options, no non-compliance was flagged for review

REPORT OF THE DIRECTORS 董事會報告									
The following table disclosed movements in the Company's share options outstanding during the year:					於本年度，本公司已授出尚未獲行使的購股權變動如下：				
Name and category of grantee	Number of share options 購股權數目					Vesting period	Exercise period of share options	Exercise price of share options	Date of grant
	At 1 April 2017	Granted during the year	Exercised during the year	Lapsed during the year	At 31 March 2018				
授予人及類別	於二零一七年四月一日	於本年度內授出	於本年度內行使	於本年度內註銷	於二零一八年三月三十一日	授予期	行使期	行使價	授予日
	'000	'000	'000	'000	'000			HK\$ per share	
	千份	千份	千份	千份	千份			每股港幣	
		(Note (i))		(Note (ii))				(Note (iii))	
		(附註(i))		(附註(ii))				(附註(iii))	
Directors, chief executive and a substantial shareholder and their associates 董事、最高行政人員及主要股東及其聯繫人士：									
Mr. NGAI 魏先生	4,500	—	—	—	4,500	10/09/2015 to 09/03/2016 10/09/2015至09/03/2016	10/03/2016 to 09/09/2020 10/03/2016至09/09/2020	0.526	10/9/2015
Mr. YAU 游先生	4,500	—	—	—	4,500	10/09/2015 to 09/03/2016 10/09/2015至09/03/2016	10/03/2016 to 09/09/2020 10/03/2016至09/09/2020	0.526	10/9/2015
	9,000	—	—	—	9,000				
Other employees: 其他僱員：									
In aggregate 總額	1,620	—	(180)	(240)	1,200	10/09/2015 to 09/03/2016 10/09/2015至09/03/2016	10/03/2016 to 09/09/2020 10/03/2016至09/09/2020	0.526	10/9/2015
	10,620	—	(180)	(240)	10,200				



Step 3: Recommend a compliance assessment



- **Value-based check**

- *Conditional upon other information:* values from multiple sources are extracted to verify consistency; oftentimes numeric formulae and / or logic are involved

Example:

App 16(32)(5): A listed issuer shall include in its annual report a discussion and analysis of the group's performance during the financial year and the material factors underlying its results and financial position, including details of material acquisitions and disposals of subsidiaries, associates and joint ventures.

The model picked up the date of such a major transaction in relation to the acquisition of the entire issued capital of a certain company from the 2017 Annual Report, and successfully located the corresponding announcement the issuer made in relation to this acquisition under the headline "Major Transaction". As the two dates do not match (23 March in Annual Report and 22 March in transaction announcement), this case was flagged for human review. Upon checking, reviewer confirms that the disposal was not completed until 2018, which was not during the 2017 financial year, and determines that there is no non-compliance with regard to the issuer's 2017 Annual Report.

made by the Plaintiff in the Construction Disputes are without merits, and accordingly no provision has been made in these consolidated financial statements.

46. EVENT AFTER THE REPORTING PERIOD

On **23 May 2017**, a wholly owned subsidiary of the Company, entered into an agreement with third parties (the "Vendors") for the acquisition of the entire issued share capital of (" ") and the shareholders' loan due by to the Vendors (the "Acquisition"). The consideration for the Acquisition is approximately **HK\$375 million** which is subject to adjustments of net current asset value of as at the completion date.

The Acquisition has not been completed up to the date of approval of these consolidated financial statements.

date	parties	currency	amount	context
22March 2017	the Vendors; a...	HK\$	37500000.0	Subject to the

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MAJOR TRANSACTION IN RELATION TO THE ACQUISITION OF THE ENTIRE ISSUED SHARE CAPITAL OF

THE ACQUISITION

The Board is pleased to announce that on **22 March 2017**, the Purchaser, a wholly-owned subsidiary of the Company, entered into the Preliminary Agreement with the Vendors, pursuant to which the Vendors agreed to sell and assign, and the Purchaser agreed to purchase and take up the assignment of, the Sale Shares and the Sale Loans.

Subject to the Adjustments, the Consideration payable by the Purchaser to the Vendors for the Acquisition is **HK\$375,000,000**.

The Vendors and the Purchaser shall negotiate in good faith and use all reasonable endeavours to agree and enter into a Formal Agreement on or before 22 May 2017 (or such other date as the Vendors and the Purchaser may agree in writing), which shall reflect the principal terms contained in the Preliminary Agreement and incorporate other customary terms. In the event that the Vendors and the Purchaser shall fail to reach agreement on the terms of the Formal Agreement on or before 22 May 2017 (or such other date as the Vendors and the Purchaser may agree in writing), the Preliminary Agreement shall remain in full force and effect and the parties to the Preliminary Agreement shall continue to fulfil their respective obligations thereunder. Further announcements will be made if and when the Formal Agreement is executed in compliance with the Listing Rules.



Platform interface: Annual Report review page

Users go over issuers' Annual Reports on the **Annual Report review page**. This is where the list of AI-recommended disclosures and compliance suggestions are shown and users decide whether issuers are compliant. If the AI suggestions are incorrect, users submit corrections separately to optimise the AI models. The relevant corporate communications can be accessed for further verification; see the next slide for selected examples.

Stock Code: 00388 HKEX

Report Year: 2016 Last AR: 2017 Published: Mar 20 2017 Financial Year-end: Mar 31 2017

Score for This AR: 100% Flag for Follow-up: ☐ Back to Dashboard

Predicted Score: 100% Mark as Complete: ☒

Listing Rule: A1

Rule 13.35: An issuer shall include in its annual report a statement of sufficiency of public float. The statement should be based on information that is publicly available to the issuer and within the knowledge of its directors as at the latest practicable date prior to the issue of the annual report.

AI Location Suggestion

Disclosure Information

	Disclosure	Negative Statement	No Disclosure
AI Suggestion	✓		

Compliance Assessment

	Compliance	Non-Compliance
AI Suggestion	✓	

Additional Documents

A list of suggestions are shown ranked by model confidence

If Listing Rule involves referencing additional corporate communications, these corporate communications can be accessed here



Platform interface: samples of corporate communications referenced

1 Share Repurchase Reports

Share Repurchase Reports

Stock Code	Trading Date	# Securities Purchased	Total Purchase Price	Source
00000	Sep 6 2019	288,000	HKD 25,719,675.00	Link
00000	Sep 5 2019	550,000	HKD 49,695,800.00	Link
00000	Sep 4 2019	600,000	HKD 54,489,700.00	Link
	Total in FY	1,438,000	HKD 130,005,175.00	

2 Monthly Returns

Mar 2019
Feb 2019
Jan 2019
Dec 2018
Nov 2018

HKEX

香港交易所

Monthly Return of Equity Issuer on Movements in Securities

For the month ended (dd/mm/yyyy) : 31/03/2019

To : Hong Kong Exchanges and Clearing Limited

Name of issuer
Date Submitted

I. Movements in Authorised Share Capital

1. Ordinary Shares

(1) Stock code : 1	Description : Ordinary Shares				
	No. of ordinary shares	Par value (HK\$)	Authorised share capital (HK\$)		
Balance at close of preceding month	8,000,000,000	1.00	8,000,000,000		
Increase/(decrease) during the month	NIL		NIL		
Balance at close of the month	8,000,000,000	1.00	8,000,000,000		

(2) Stock code : N/A Description : N/A

	No. of ordinary shares	Par value (State currency)	Authorised share capital (State currency)
Balance at close of preceding month	N/A	N/A	N/A
Increase/(decrease) during the month	N/A		N/A
Balance at close of the month	N/A	N/A	N/A

II. Details of Movements in Issued Share Capital

Share Options (under Share Option Schemes of the Issuer)

Particulars of share option scheme including EGM approval date (dd/mm/yyyy) and class of shares issued	Movement during the month	No. of new shares of issuer issued during the month pursuant thereto	No. of new shares of issuer which may be issued pursuant thereto as at close of the month
	Granted	Exercised	Cancelled
1 N/A			
(/ /) shares (Note 1)	N/A	N/A	N/A
2 N/A			
(/ /) shares (Note 1)	N/A	N/A	N/A
3 N/A			
(/ /) shares (Note 1)	N/A	N/A	N/A
Total A. (Ordinary shares) (Preference shares) (Other classes)			N/A
Total funds raised during the month from exercise of options (State currency)			N/A

Extracted details are displayed here



Platform interface: samples of corporate communications referenced

3 Transaction announcements

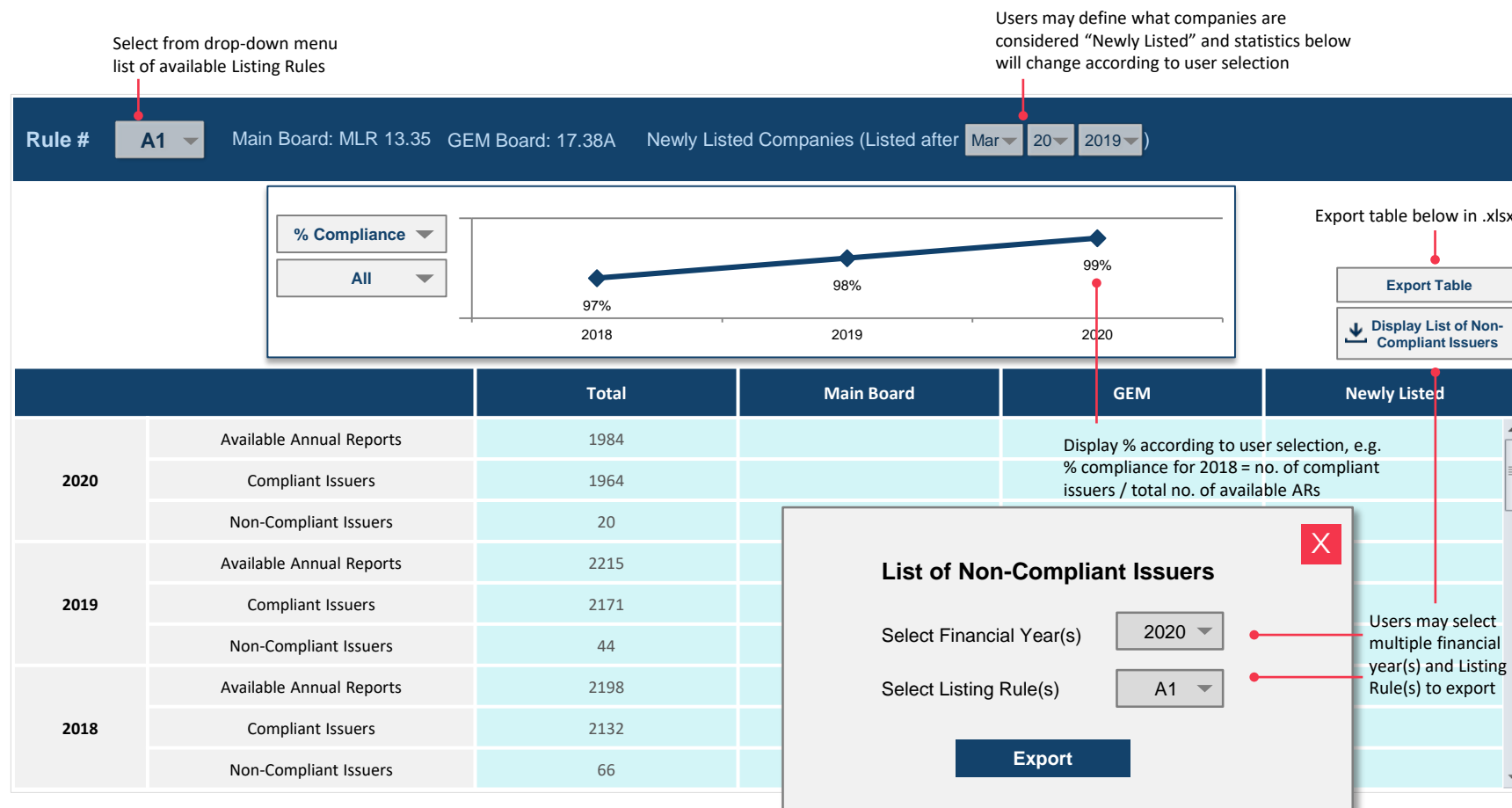
The screenshot displays a document titled 'Transaction announcements' on the HKEX platform. The document is dated 'Nov 20 2018' and includes a disclaimer from the Hong Kong Exchanges and Clearing Limited and The Stock Exchange of Hong Kong Limited. The document is structured into sections: 'CONNECTED TRANSACTION AND MAJOR TRANSACTION', 'CONNECTED TRANSACTION AND DISCLOSEABLE TRANSACTION', and 'PROPOSED ACQUISITION BY BID OR BY WAY OF THE TRUST SCHEMES OF ALL OF THE STAPLED SECURITIES IN ISSUE OF APA WHICH ARE LISTED ON THE AUSTRALIAN SECURITIES EXCHANGE AND FORMATION OF JOINT VENTURE'. The 'Introduction' section states: 'Reference is made to the announcement of CKA, CKHI, CKI and PAH on 13 June 2018 in relation to the submission of a non-binding indicative and conditional proposal for a consortium of CKA, CKI and PAH to acquire all of the stapled securities in issue of the Target.' The 'Acquisition and Joint Venture Transaction' section states: 'The CKA Board, the CKI Board, the PAH Board and the CKHI Board jointly announce that on 12 August 2018, a consortium comprising CKA, CKI and PAH entered into the Implementation Agreement with Euloco and the Target to implement the Acquisition (comprising the acquisition of all of the stapled securities in issue of the Target).'

Extracted details with respect to the Listing Rules are displayed here, e.g. transaction dates, consideration, use of proceeds, related parties.



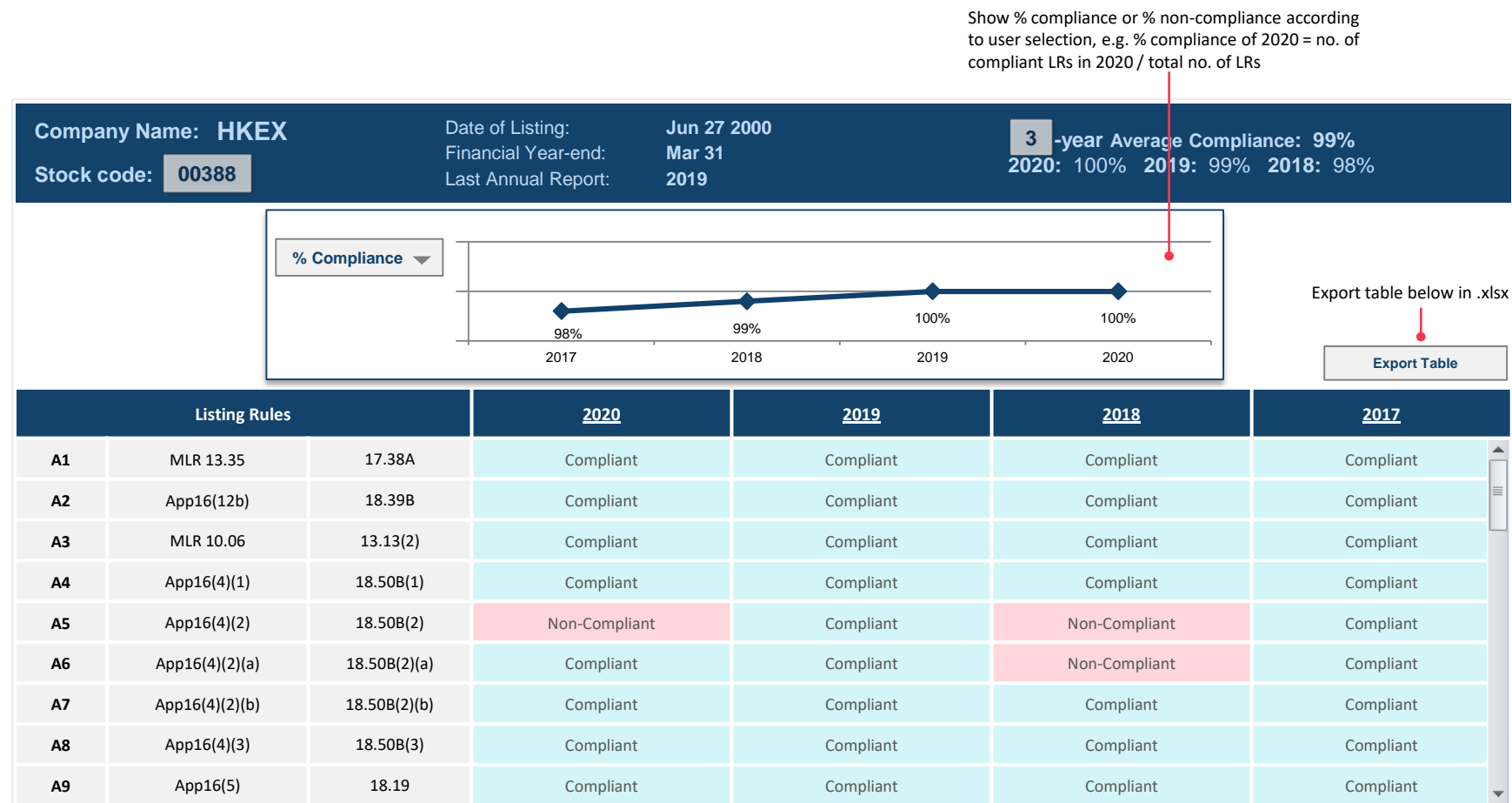
Platform interface: analysis by Listing Rule

Details of issuer compliance by Listing Rule is displayed for the Listing Division's further analysis and follow-ups.



Platform interface: analysis by issuer

Users may also look into compliance rates of a particular issuer over the years to have a better understanding.



Section 3. Lessons learnt



The project in numbers

Training data

Annual reports: **3,800+ tagged twice**

Corporate communications: **400+ tagged**

No. of Listing Rule requirements trained: **140+ disclosure location + compliance assessment**

% of all Listing Rules: **100% of “machine-friendly” Rules
Around 80% of total Rules**

Overall performance¹

	<u>Disclosure</u>	<u>Compliance</u>
Precision rates:	90%	98%

Recall rates:	79%	86%
---------------	------------	------------

Accuracy rates:	84%	85%
-----------------	------------	------------

Issuer compliance rates: **92-97%**

Time saved per Annual Report: **80% less time taken** compared with human review alone



The project in numbers

Model performance of different Listing Rule categories

			<u>Recall</u>	<u>Precision</u>	<u>Accuracy</u>	
1	Locate disclosures	General information	77%	91%	91%	
		Fine-grained information	74%	83%	86%	
2	Compliance assessment	Existence check	Simple check	95%	98%	95%
			Conditional upon other information	93%	95%	91%
		Value-based check	Simple check	97%	99%	97%
			Conditional upon other information	89%	97%	88%



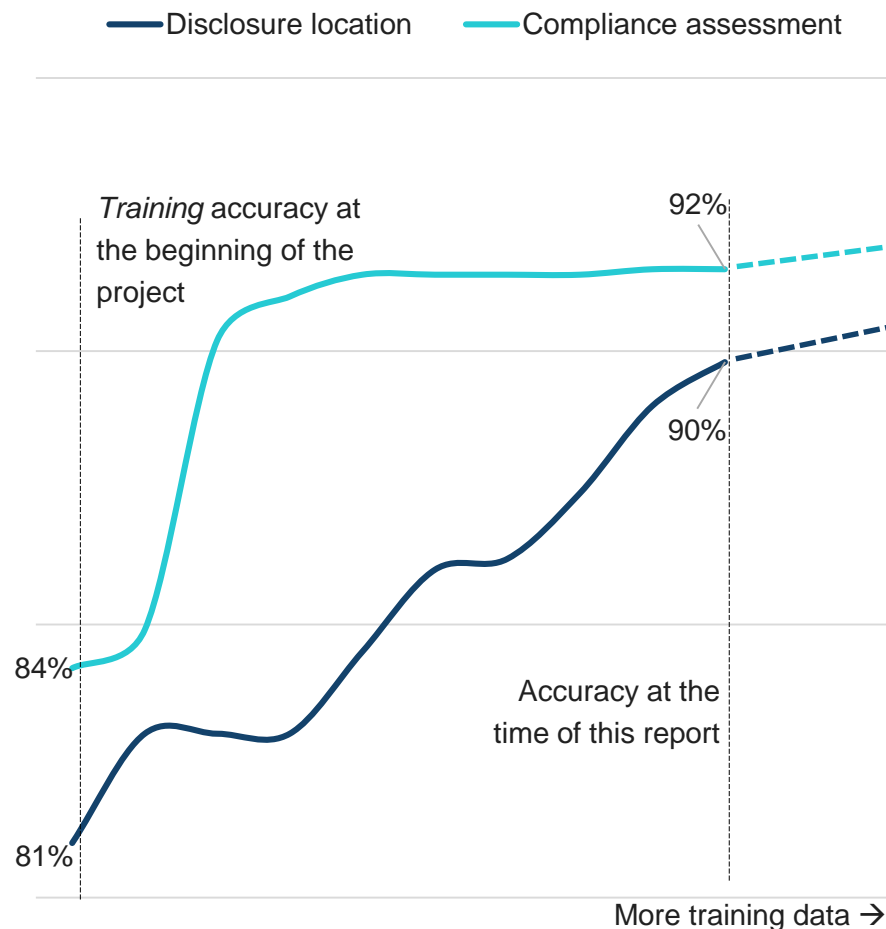
AI model performance

Bad case analysis and model improvement

Model construction requires a large amount of training data. The more good quality data there is, the better the AI models perform and it is especially so for the case of deep learning.

Apart from “feeding” more relevant disclosures and respective compliance to the model, bad case analysis is also highly relevant, especially towards the later stages of platform development. Users review preliminary AI suggestions and verify / correct accurate / inaccurate cases and adjust algorithms and logic statements (which affects also document tagging) for continuous platform optimisation.

The platform performance has steadily increased during the development of the model. Overall accuracy rates for location of Annual Report disclosures (Step 2) and issuer compliance recommendation (Step 3) for the training set reached 90% and 92% respectively at the final stages of the project. We then tested the model against 50 “unseen” Annual Reports, i.e. new reports that were not part of the training data, and the resulting accuracy rates were 84% and 85% respectively. We hope to continuously improve the performance through regular review of data generated from user verification.



Key takeaways

Adjustments required for review and assessment

Since implementation, the platform has significantly improved the review process of Annual Report disclosures and Listing Rule compliance. Document retrieval and record retention are automated and workflows are optimised through AI-suggested disclosure location and compliance assessment. With the help of the platform, the time taken to review each Annual Report has reduced by around 80% compared with human review alone.

Noting especially that the Annual Reports and corporate communications being reviewed are highly unstructured and the number of positive examples for some Listing Rules remain low, the model construction process was not without its challenges. Below are some of the key adjustments we made during the process of platform construction and project design:

- **Lopsided training data**

Training AI models against mostly compliant issuers naturally means that the number of non-compliant cases available for training is very limited. As a result, the model is less confident in the identification and assessment of non-compliance. Given the ultimate goal is to locate

non-compliant cases, we have adjusted the model to allow for a higher % of false negatives (compliance incorrectly suggested as non-compliance) compared with that of false positives, i.e. higher recall and lower precision. The human review process that follows creates further corrections for model training and optimisation.

- **Amount of document tagging required**

For most of the Listing Rules, we were able to achieve relatively high accuracy in the simple location of disclosures (without fine-grained information or categorising whether disclosure located is a positive or negative statement) with less than 500 Annual Reports tagged. It becomes challenging only as the machine needs to interpret semantic meaning and locate precise data points. While more training data and/or user corrections can get to better AI performance, for our case the rate of accuracy increase lowers as more data is tagged. Sometimes the appropriate use of business rules and keywords would save a lot of time and costs incurred.

- **Bilingual Annual Reports**

As we have decided to focus on training English Annual Reports in our project, the process of document structure recognition was adjusted to locate and process only the English equivalents in bilingual Annual Reports.



Key takeaways

In addition, we have the following observations applicable to developing general AI models for purposes beyond compliance assessment and regulatory uses.

- **Pinpoint the business problems and objectives**

Solving for too many scenarios at once can become difficult to manage. In our case of Listing Rule compliance review, we have created subsets solving for specific attributes (e.g. number of share options cancelled) instead of all relevant information at once.

- **Take time to think through the training setup**

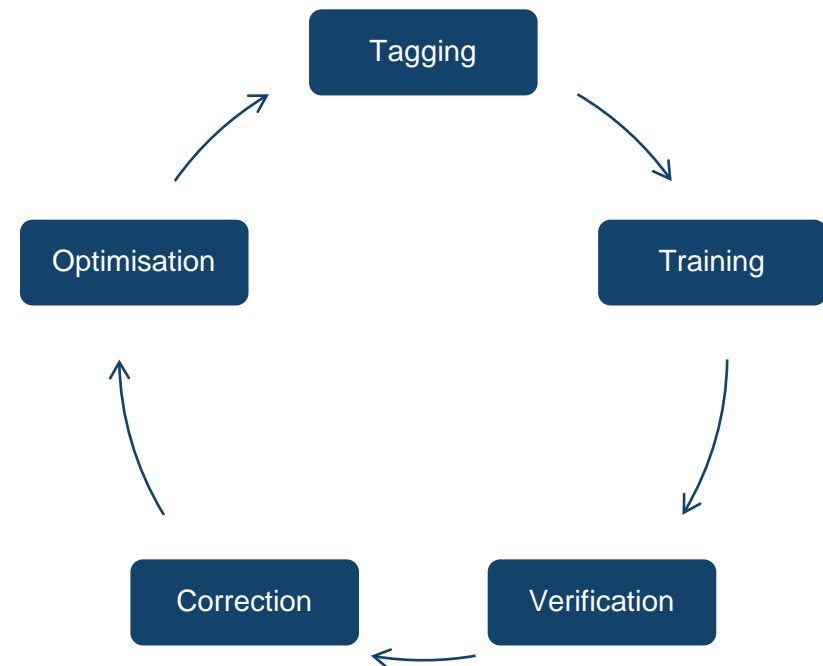
The granularity of the tagging should match how detailed the resulting fine-grained information needs to be. There are often multiple valid inputs for a single business requirement, so make sure to consider all of them. Introduce a diverse team of talent in order to minimise bias stemming from subject matter comprehension.

- **The quality of the tagged information is *extremely* important**

The set of training data is essentially a baseline for model construction and analysis and serves as the foundation for the platform. Develop a valid quality checking system to ensure information tagged is relevant and accurate. Consult subject matter expertise whenever the need arises.

- **Regularly test the model with end users to collect feedback**

Not only does it create a continuous stream of correction for model optimisation through process depicted below, it ensures that any business rules identified remain valid and accurate.



Section 4. Next steps



What the future holds

Capturing the power of technology to improve transparency in our markets

Technology is one of the three focus areas identified in the HKEX Group Strategic Plan 2019-2021. Against the backdrop of an accelerating pace of 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.

HKEX will continue this initiative with a long term view to promote completeness in issuer disclosures, and more generally, to apply AI to improve efficiency in other vetting processes. Future areas of research include extending the platform developed with PAI Tech to results announcements and other types of regular corporate communications.

For further enquiries, please contact the project team at Listed Issuer Regulation under HKEX's Listing Division (LIRIT@hkex.com.hk) or PAI Tech (contact@paodingai.com).



About HKEX



Hong Kong Exchanges and Clearing Limited (HKEX) is one of the world's major exchange groups, and operates a range of equity, commodity, fixed income and currency markets. HKEX is the world's leading IPO market and as Hong Kong's only securities and derivatives exchange and sole operator of its clearing houses, it is uniquely placed to offer regional and international investors access to Asia's most vibrant markets.

HKEX is also the global leader in metals trading, through its wholly owned subsidiaries, The London Metal Exchange (LME) and LME Clear Limited. This commodity franchise was further enhanced with the launch of Qianhai Mercantile Exchange (QME), in China, in 2018.

HKEX launched the pioneering Shanghai-Hong Kong Stock Connect programme in 2014, further expanded with the launch of Shenzhen Connect in 2016, and the launch of Bond Connect in 2017.

www.hkexgroup.com

About PAI Tech



Beijing Paoding Technology Limited Company (PAI Tech), the leading pioneer in the field of 'document intelligence', provides the desktop tools, SaaS services and enterprise-level applications for intelligent writing, review, and reusing of business documents. Rooted in the financial industry with the focus on the RegTech, we aim to relieve the compliance and efficiency issues in financial document processing. Also, based on our document intelligence platform which supports customised plug-in development, we are cultivating the ecosystem across various industries.

Our current clients include the China Securities Regulatory Commission, the three major stock exchanges in China (Shanghai Stock Exchange, Shenzhen Stock Exchange, and HKEX), the top 10 securities firms in China, as well as several banks, asset management companies and accounting firms.

www.paodingai.com

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