JPX
WORKING
PAPER

Automated Determination of TCFD Recommended Disclosures through Zero-shot Text Classification Using Large Language Models (abridged version)

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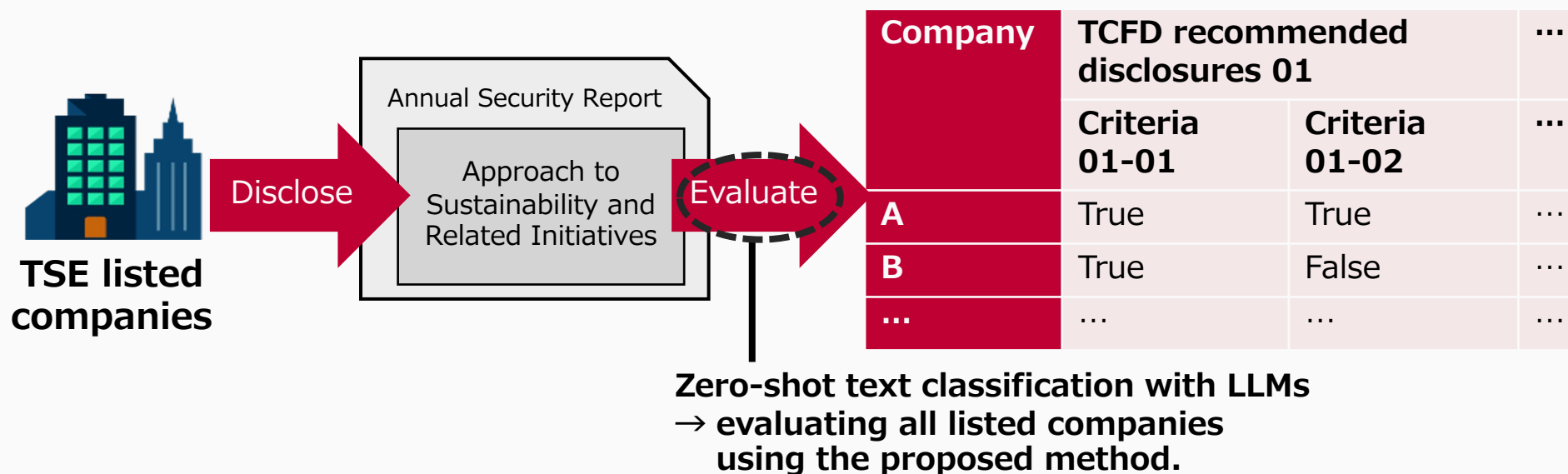3 Chief ESG Innovation Officer, Cierpa & Company, Inc.
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Remarks

This material was compiled based on the results of research and studies by directors, officers, and/or employees of Japan Exchange Group, Inc., its subsidiaries, and affiliates (hereafter collectively the "JPX group") and external researchers with the intention of seeking comments from a wide range of persons from academia, research institutions, and market users. The views and opinions in this material are the writer's own and do not constitute the official view of the JPX group. This material was prepared solely for the purpose of providing information and was not intended to solicit investment or recommend specific issues or securities companies. The JPX group shall not be responsible or liable for any damages or losses arising from the use of this material. This English translation is intended for reference purposes only. In cases where any differences occur between the English version and its Japanese original, the Japanese version shall prevail. This translation is subject to change without notice. The JPX group shall accept no responsibility or liability for damages or losses caused by any error, inaccuracy, misunderstanding, or changes with regard to this translation.

Outline of This Study

- The Task Force on Climate-related Financial Disclosures (TCFD) has developed 11 recommended climate change-related disclosures to promote their use as a standard for climate-related disclosures.

- Analysis of the actual disclosure status based on the recommended disclosure items requires analysis of a large amount of data.

- We proposed <u>a method to automatically evaluate the TCFD recommended disclosures</u>, verify the accuracy of the classification, and <u>evaluate the securities reports of companies listed on the Tokyo Stock Exchange for the fiscal year 2023</u>.

  - Decompose each TCFD recommended disclosure item into more basic units (**TCFD recommended disclosure criteria**, hereafter referred to as "the Criteria") (*) for automatic judgment of the item.

  - **Zero-shot text classification** (**) using large-scale language models (LLMs)

TSE listed companies → Disclose → Annual Security Report (Approach to Sustainability and Related Initiatives) → Evaluate →

Company	TCFD recommended disclosures 01		...
	Criteria 01-01	Criteria 01-02	...
A	True	True	...
B	True	False	...
...	...	...	...

Zero-shot text classification with LLMs
→ evaluating all listed companies using the proposed method.

(*) Latest version available on GitHub: https://github.com/cierpa/tcfd_criteria
(**) Natural language processing task that classifies text without requiring training data

TCFD Disclosures

- The TCFD Recommendations, published in 2017[1], set out the following:
  - Four core elements: Governance, Strategy, Risk Management, and Metrics & Targets
  - 11 recommended disclosures linked to the above core elements
    (TCFD Recommended Disclosures)

- Listed companies should disclose information based on the TCFD recommended disclosures to clarify risks and opportunities related to climate change and governance and strategy related to these risks and opportunities.
  - This type of disclosure is referred to as TCFD disclosure.

- In Japan, listed companies must disclose sustainability information in the "Approach to Sustainability and Related Initiatives" section of their annual securities reports for the fiscal year ending March 31, 2023, and after that.

Part of the sustainability disclosures of the Japan Exchange Group, Inc. for the fiscal year ending March 31, 2022
(Left: Japanese, Right: English)

EDINET提出書類
株式会社日本取引所グループ(E03814)
有価証券報告書

２【サステナビリティに関する考え方及び取組】

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　当社グループは、企業理念で掲げる「市場の持続的な発展を図り、豊かな社会の実現に貢献」に向け、我々を取り巻く環境や社会課題、それらとの関係に目を向け、企業価値の向上につながる取組を進めることが重要な経営課題の一つであると認識し、経営方針を定め、経営計画等を策定しています（第２　事業の状況－１　経営方針、経営環境及び対処すべき課題等参照）。

　公正性・信頼性を備えた利便性・効率性及び透明性が高い市場と魅力的なサービスを提供するという当社グループのビジネスモデルを踏まえると、市場メカニズムを活用した取組を進めていくことが肝要と考え、長期ビジョンのもと、中期経営計画2024では３つのFocusの一つに「社会と経済をつなぐサステナビリティの推進」を掲げ、サステナビリティ関連情報の発信に係る機能強化や、関連指数算出・商品の上場、排出量市場創設の推進等に取り組んでいます。

　当社グループのサステナビリティに関する考え方及び取組については、当社ウェブサイトもご参照ください。
　https://www.jpx.co.jp/corporate/sustainability/index.html

2　Approach to Sustainability and Related Initiatives

(1)　Approach and Organization
　In order to "contribute to the realization of an affluent society by promoting sustainable development of the market" as set out in its Corporate Philosophy, the Group works on initiatives to improve its corporate value with attention to the surrounding environment and societal issues and the Group's relationship to them. The Group considers this an important management issue and formulates its management policies and plans accordingly (see "1 Management Policy, Business Environment, and Issues to be Addressed" in "II Overview of Business").

　Given its business model, which is to provide attractive services along with a highly convenient, efficient, and transparent market that ensures fairness and reliability, the Group considers it essential to work on initiatives that utilize market mechanisms. Accordingly, in line with its long-term vision, the Group set out "promoting sustainability that connects society and economy" as one of the three Focus areas in its Medium-Term Management Plan 2024 and is working on related initiatives such as enhancing dissemination functions for sustainability-related information, calculating sustainability-related indices and listing-related products, and advancing the creation of an emissions trading market.

　For more information on the Group's approach to sustainability and related initiatives, please see the below webpage.
　https://www.jpx.co.jp/english/corporate/sustainability/index.html

Background of the Study on TCFD Disclosures

- Sustainability information disclosures are presented in various formats, including natural language, on each company's documents, and the information is not structured. Therefore, reading the documents is necessary to investigate the fulfillment of the TCFD recommended disclosures.

- Can machine learning methods reduce the burden of checking for fulfillment?

Previous work of Auzepy et al. [2]

➢ Using a learned zero-shot text classification model, they surveyed 3,335 disclosures by banks worldwide to determine whether they meet the TCFD's recommended disclosures.

➢ The model is available in English only.

➢ Accuracy is about 60%.

Previous work of Doi et al. [3]

➢ Validating the Accuracy of Zero-Shot Text Classification of Key Audit Matters in Japanese Audit Reports Using LLMs.

> ➢ Classified into 10 different topics

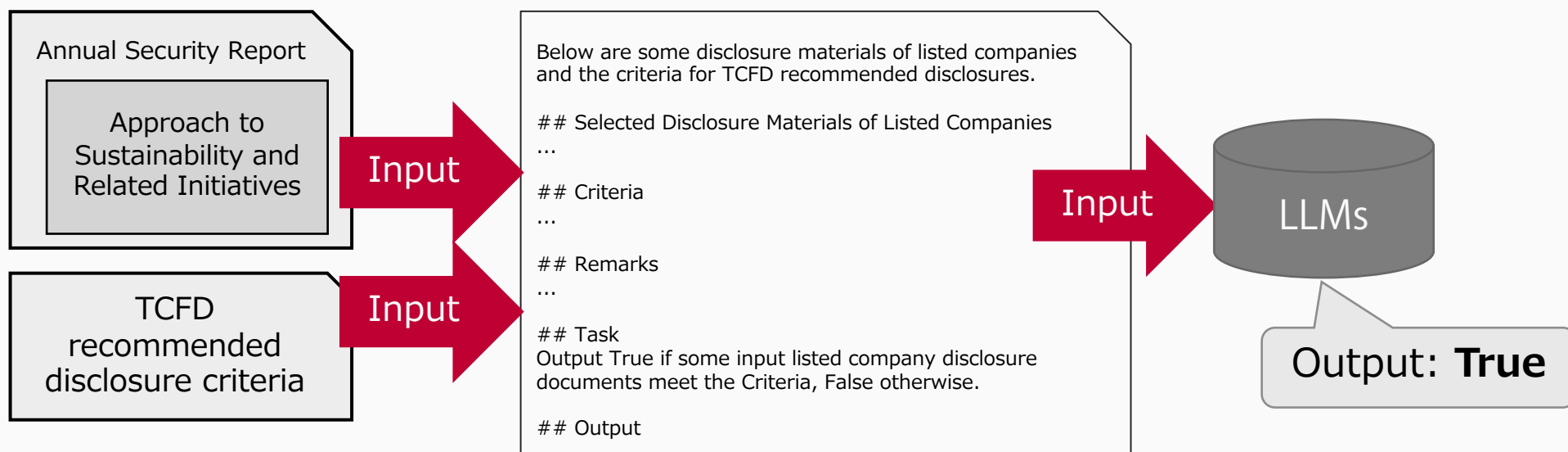➢ Confirmation of up to 86% Accuracy using the ChatGPT-based method.
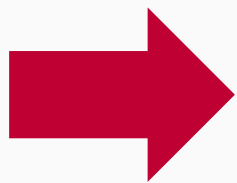
(Hypothesis)
Zero-shot text classification using LLMs is effective for investigating the fulfillment of TCFD recommended disclosure items in Japanese TCFD disclosures.

Purpose of This Study and Proposed Method

- We propose a method for mechanically classifying the fulfillment status of TCFD recommended disclosures based on **zero-shot text classification** using LLMs for sustainability information disclosures in the annual securities reports of listed companies on the Tokyo Stock Exchange.

- For each of the 11 TCFD recommended disclosures, we developed the **TCFD recommended disclosure criteria**, which consist of 27 items, to determine whether each company's disclosure content is in line with each item or not.

- After verifying the accuracy of the proposed classification method, we will use it to investigate the fulfillment status of TCFD recommended disclosures in the securities reports of listed companies on the Tokyo Stock Exchange for the fiscal year 2023.

Image of the proposed method

Annual Security Report

Approach to Sustainability and Related Initiatives

Input

TCFD recommended disclosure criteria

Input

Below are some disclosure materials of listed companies and the criteria for TCFD recommended disclosures.

Selected Disclosure Materials of Listed Companies
…

Criteria
…

Remarks
…

Task
Output True if some input listed company disclosure documents meet the Criteria, False otherwise.

Output

Input

LLMs

Output: **True**

Flow of This Study
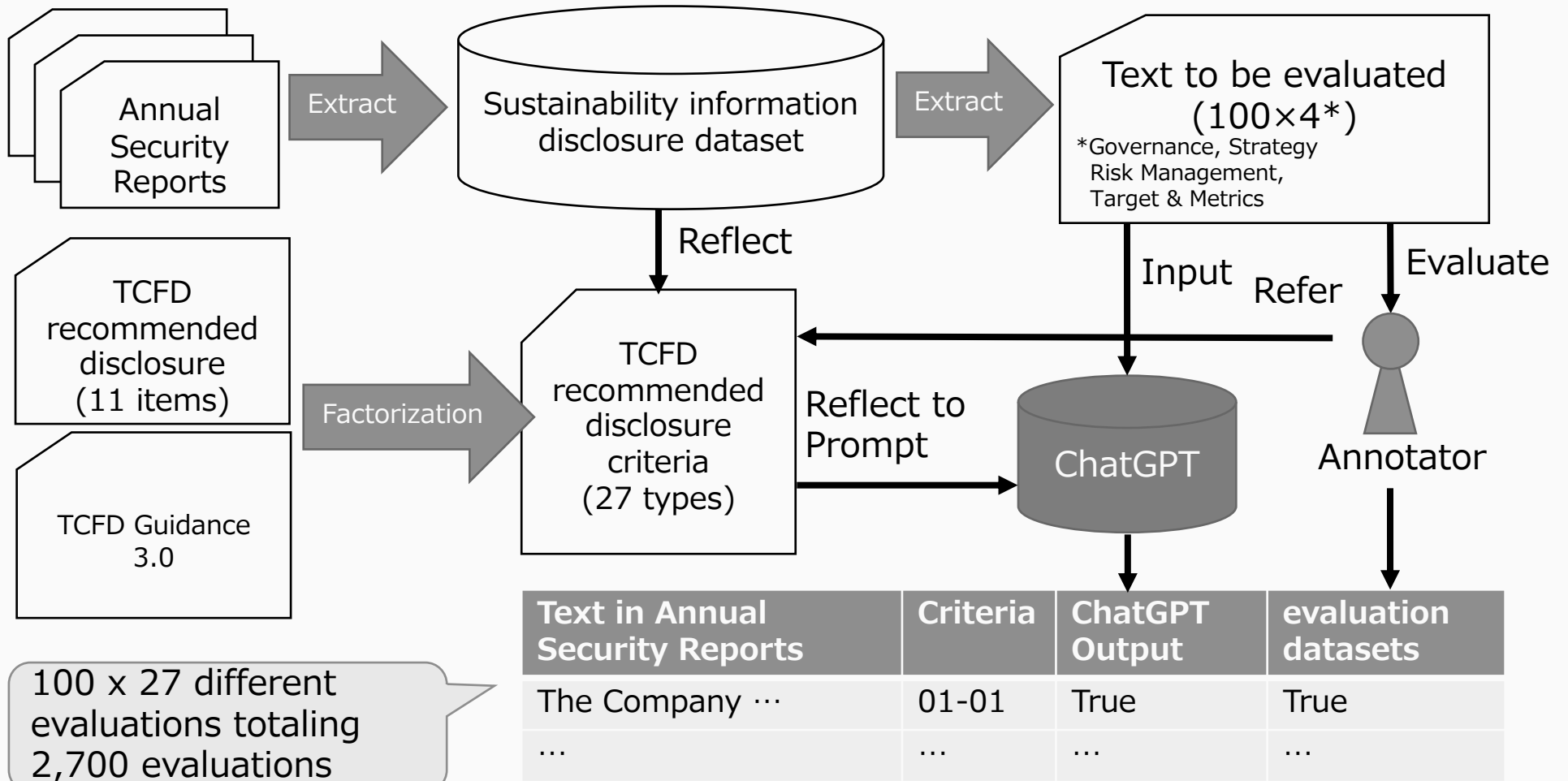
1. Evaluation of the proposed method

- Creation of the Sustainability information disclosure dataset
- Creation of TCFD Recommended Disclosure Criteria
- Creation of manually annotated dataset for evaluation
- Experimental evaluation of LLMs and classification methods based on the Criteria

2. Investigation of the fulfillment of TCFD recommended disclosures

- Survey on the fulfillment of TCFD recommended disclosures in the annual securities reports of listed companies on the Tokyo Stock Exchange using the Sustainability information disclosure dataset

Flow of the Evaluation Experiment

- The evaluation experiment of the proposed methodology consists of four stages:
    - creation of a sustainability information disclosure dataset, creation of TCFD recommended disclosure criteria, creation of a dataset for evaluation, and evaluation experiment.

| Annual Security Reports | → Extract → | Sustainability information disclosure dataset | → Extract → | Text to be evaluated (100×4*) *Governance, Strategy Risk Management, Target & Metrics |

Reflect

Input   Refer   Evaluate

| TCFD recommended disclosure (11 items) | → Factorization → | TCFD recommended disclosure criteria (27 types) |

TCFD Guidance 3.0

Reflect to Prompt

ChatGPT

Annotator

100 x 27 different evaluations totaling 2,700 evaluations

Text in Annual Security Reports	Criteria	ChatGPT Output	evaluation datasets
The Company ⋯	01-01	True	True
...	...	...	...

Creation of the Dataset

Collection of Annual Security Reports

- Annual Securities reports that meet the following conditions are collected using the EDINET API:
    - Disclosure dates are between April 1, 2023, and October 31, 2023.
    - The fiscal year ended on March 31, 2023, or later.
    - The issuer is a domestic stock-listed company on the Tokyo Stock Exchange as of October 31, 2023.

Extraction of Text Area

- Extract text with XBRL tag element name of DisclosureOfSustainabilityRelatedFinancialInformationTextBlock

Text Extraction Using XBRL Tags

- Extract XBRL tag element names (up to the second level) and text associated with them

Classification by XBRL tags

- Extract XBRL tag element names that contain one or more of "Governance", "Strategy", "RiskManagement", or "MetricsAndTargets".

Text normalization

- NFKC normalization, removal of extra spaces, etc.

Sample of the Dataset (Reference Translation)

Code	1stXBRL	2ndXBRL	Text
86970	GovernanceTextBlock		Governance In line with the above approach, the Group has established a Sustainability Committee with the Group CEO as Chair and Group COO as Vice-Chair. The Committee has analyzed how related issues affect business operations and is proceeding to address these. The Group has also established a system where overall approaches and important matters relating to these issues are reported to the board of directors where necessary, ensuring appropriate oversight (see "4 Corporate Governance" in "IV Information about the Reporting Company"). (Omitted)
86970	RiskManagementTextBlock		Risk Management JPX Group has established a Risk Policy Committee chaired by an outside director and a Risk Management Committee chaired by the Group CEO in order to address the various risks faced by the Group. In line with the Group's Risk Management Policy, these committees are responsible for preventing risk materialization through identification of risks and development and management of countermeasures, as well as preparing processes for a swift and appropriate response in the case risks do or are likely to materialize. (Omitted)
86970	StrategyTextBlock		Strategy JPX Group has considered the possible risks and opportunities brought on by climate change and their effects on operations, strategy, and financial planning. It is accordingly implementing measures to reduce risks and increase corporate value and has summarized these initiatives as its Green Strategy in the Medium-Term Management Plan 2024. (Omitted)
86970	StrategyTextBlock	ReferenceToOtherInformationStrategy	For details on the Group's scenario analysis, please see the below page. https://www.jpx.co.jp/english/corporate/sustainability/jpx-esg/environment/01.html

(1) Restricted period of annual securities report submissions

- The dataset is based on annual securities reports submitted to EDINET from April 1, 2023, to October 31, 2023. Therefore, it covers only part of the 2023 fiscal year (ending March 2024) and excludes reports submitted after this period, for example, the reports of companies with a fiscal year ending in August 2023 or later.

- This constraint limits the comprehensiveness of the data, preventing a complete picture of companies listed on the Tokyo Stock Exchange.

(2) Use of text information only

- The dataset is limited to text information and tables (which are converted to double lists and used as text information) and excludes visual details such as images.

- Visual information, such as numerical data and graphs depicting future scenario analyses, is also crucial in TCFD disclosures.

- The inability to capture visual elements in the dataset limits the analysis.

(3) Non-consideration of external materials

- Annual securities reports may include limited TCFD disclosures by some listed companies and instead provide references to external materials, including sustainability reports.

- The dataset extracts text only from annual security reports and excludes text from external materials.

- Consequently, the present analysis is limited to the information described in the annual securities reports, preventing a comprehensive capture of the full scope of sustainability initiatives by the listed companies.

Statics of the Dataset

Strings contained in the XBRL tags	Number of Texts	Number of Companies	Number of Characters	Average Number of Characters per Company
Governance	2,721	2,178	1,071,287	491.9
Strategy	4,551	2,164	4,291,547	1,983.2
RiskManagement	2,667	2,145	987,729	460.5
MetricsAndTargets	4,233	2,118	2,475,695	1,168.9
Whole	13,530	2,198	8,089,292	3,680.3

- Prepared our analysis from the annual securities reports from April 1, 2023, to October 31, 2023, covering Japanese companies listed on the Tokyo Stock Exchange as of October 31, 2023.

- Extracted text related to sustainability information from these annual securities reports, resulting in text from 2,198.

Abstract of the Criteria

- Developed 27 TCFD Recommended Disclosure Criteria (the Criteria) to evaluate the TCFD Recommended Disclosures in more detail.

- Further subdivided the 11 TCFD recommended disclosures and established specific evaluation criteria for each item.

Core elements	TCFD recommended disclosure	TCFD recommended disclosure criteria (The criteria)
Governance	Board oversight	Process of reporting to the board on climate-related issues
	Management's role	Frequency of reporting to the board on climate-related issues
		Consideration of climate-related issues by the board
Strategy	Risks and opportunities	How the board monitors and oversees progress
	Impact on businesses, strategy, and financial planning	
	Description of resilience of strategy based on scenarios	Organization structure
Risk Management	Processes for identifying and assessing risks	Process by which management is informed about climate-related issues
	Processes for managing risks	How management monitors climate-related issues
	Integration of identifying, assessing and managing risks into overall risk management	
Metrics & Targets	Metrics used to assess risks and opportunities	
	Scope 1 and Scope 2 emissions	......
	Targets used to manage risks and opportunities	

Design of the Criteria

- Developed the Criteria by further subdividing the 11 TCFD recommended disclosures concerning the Guidance on Climate-related Financial Disclosures 3.0

- Designed the Criteria to be independent of each other

Guidance on Climate-related Financial Disclosures 3.0 (TCFD Guidance 3.0)

Ex. Governance: Board oversight

In describing the board's oversight of climate-related issues, organizations should consider including a discussion of the following:

- **processes** and **frequency** by which the board and/or board committees (e.g. audit, risk, or other committees) are informed about climate-related issues.
- …
- …

The criteria

ID: TCFD-G-01-01

Title:
Process of reporting to the board on climate-related issues

Definition:
Does the text describe the **processes** by which the board and/or board committee are informed about climate-related issues?
…

ID: TCFD-G-01-02

Title:
Frequency of reporting to the board on climate-related issues

Definition:
Does the text describe the **frequency** by which the board and/or board committee are informed about climate-related issues?
…

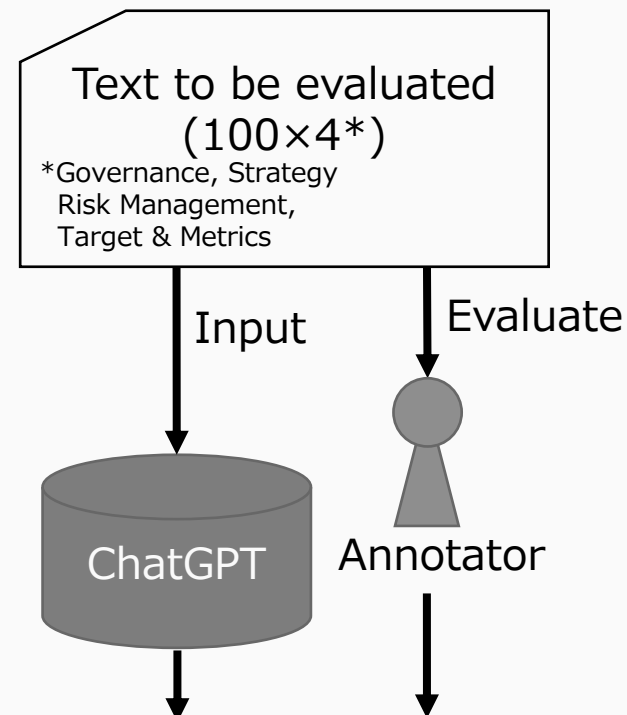# Evaluation Experiment: Creation of Dataset for Evaluation

1. Randomly extract 100 texts corresponding to Governance, Strategy, Risk Management, and Metrics & Targets from the dataset (400 texts in total).

2. Manually label each extracted text with the fulfillment status (binary classification: fulfill or does not fulfill) under Governance, Strategy, Risk Management, or Metrics & Targets.

Annotation Example

Code	Text	01-01 Process of reporting to the board on climate-related issues	01-02 Frequency of reporting to the board on climate-related issues	01-03 Consideration of climate-related issues by the board	01-04 How the board monitors and oversees progress	02-01 Organization structure	02-02 Process by which management is informed about climate-related issues	02-03 How management monitors climate-related issues
86970	Governance In line with the above approach, the Group has established a Sustainability Committee with the Group CEO as Chair and Group COO as Vice-Chair. The Committee has analyzed how related issues affect business operations and is proceeding to address these. The Group has also established a system where overall approaches and important matters relating to these issues are reported to the board of directors where necessary, ensuring appropriate oversight (see "4 Corporate Governance" in "IV Information about the Reporting Company"). (Omitted)	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE

- Verify the accuracy of the proposed method in classifying the fulfillment of each of the Criteria on the evaluation dataset.
  - Governance: 100 texts × 7 criteria
  - Strategy: 100 texts × 10 criteria
  - Risk Management: 100 texts × 4 criteria
  - Metrics and Targets: 100 texts × 6 criteria
  - → Total: 100 texts × 27 criteria
  - → 2,700 texts true/false decisions

- Use ChatGPT, both GPT-3.5 and GPT-4, as LLMs
  - GPT-3.5: gpt-3.5-turbo-0125
  - GPT-4: gpt-4-0125-preview

Text to be evaluated (100×4*)
*Governance, Strategy Risk Management, Target & Metrics

Input | Evaluate

ChatGPT

Annotator

100 x 27 different evaluations totaling 2,700 evaluations

Text in Annual Security Reports	Crite-ria	ChatGPT Output	evaluation datasets
The Company…	01-01	True	True
…	…	…	…

Measure the evaluation indices of ChatGPT classification by matching the results of human evaluations

- Use Accuracy, Precision, Recall, and F1-score as evaluation indices
  - Accuracy: The ratio of correctly classified evaluations among all evaluations
  - Precision: The ratio of predicted True data that are actually True
  - Recall: The ratio of actual True data that are predicted as True
  - F1-score: The harmonic mean of Precision and Recall, which evaluates the overall accuracy of the proposed method

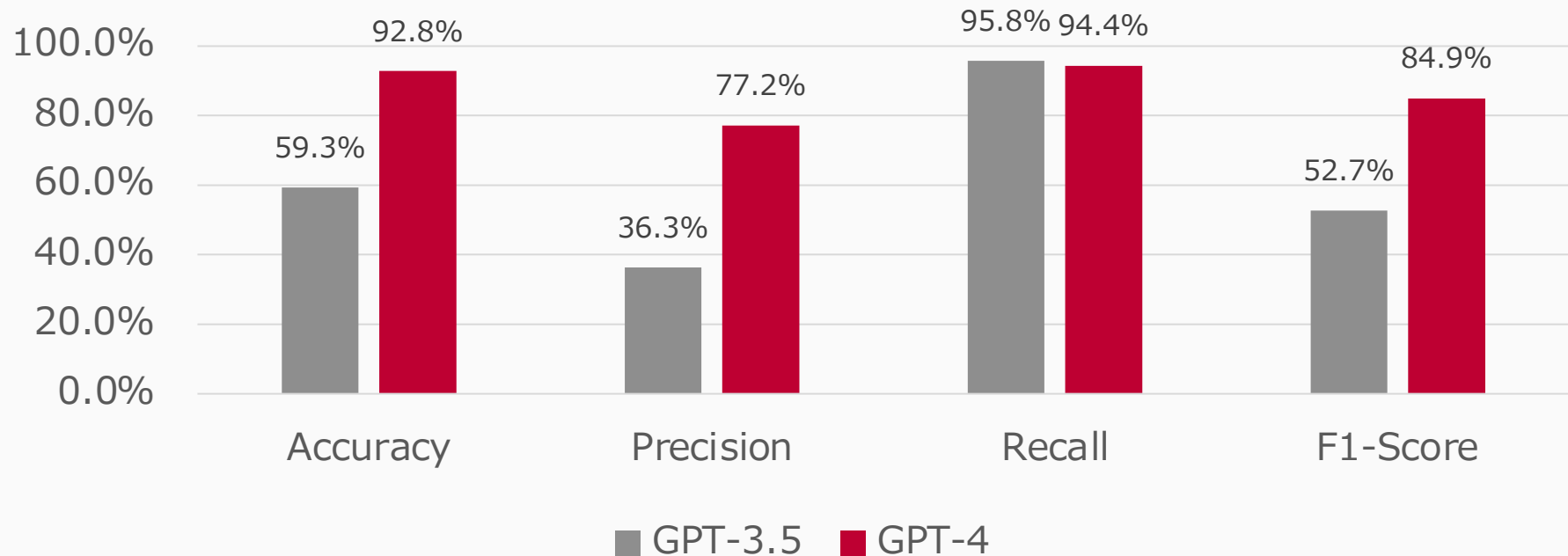|		Actual results	
		True	False
ChatGPT Predic-tions	True	**TP**: True Positive	**FP**: False Positive
	False	**FN**: False Negative	**TN**: True Negative

$$Accuracy = \frac{TP + TN}{TP + TN + FP + FN}$$

$$Precision = \frac{TP}{TP + FP}$$
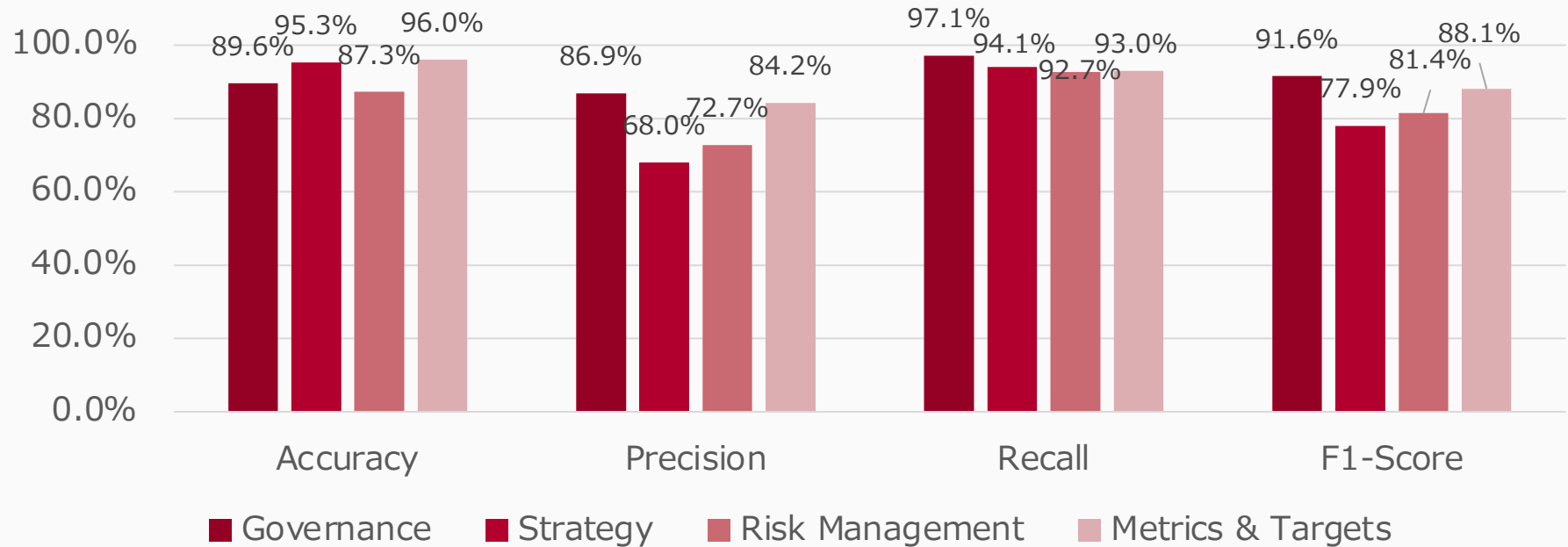
$$Recall = \frac{TP}{TP + FN}$$

$$F\text{-}1\ Score = 2 \times \frac{Precision \times Recall}{Precision + Recall}$$

Comparison of GPT-3.5 and GPT-4

Bar chart comparing GPT-3.5 and GPT-4:

Metric	GPT-3.5	GPT-4
Accuracy	59.3%	92.8%
Precision	36.3%	77.2%
Recall	95.8%	94.4%
F1-Score	52.7%	84.9%

- GPT-4 enables the classification of this criterion with high accuracy.
  - The overall correct response rate of 92.8% is higher than the 86% of the previous study by Doi et al. [4].
- GPT-4 and GPT-3.5 have a high reproducibility rate, but the conformance rate is an issue.
  - More detailed prompt design and additional tuning might be needed to improve LLMs' ability to understand context.

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Evaluation by Core Elements

Legend: Governance ■ Strategy ■ Risk Management ■ Metrics & Targets

Metric	Governance	Strategy	Risk Management	Metrics & Targets
Accuracy	89.6%	95.3%	87.3%	96.0%
Precision	86.9%	68.0%	72.7%	84.2%
Recall	97.1%	94.1%	92.7%	93.0%
F1-Score	91.6%	77.9%	81.4%	88.1%

- Governance and Metrics & Targets have higher overall classification accuracy.

- Strategy and Risk Management have lower compliance rates than others.
  - Significantly lower for specific Criteria.

- For specific criteria, it might be necessary to improve the design of the prompts or optimize the classification process to improve classification accuracy.

Investigation of the Fulfillment Status of TCFD Recommended Disclosures

- Using the methodology proposed in this study, we investigated the fulfillment of the TCFD recommended disclosures in the sustainability information included in the annual securities reports of listed companies on the Tokyo Stock Exchange.
  - As the "Constraints of the dataset" slide shows, external documents and figures are excluded from the survey.

- The survey covered 13,530 texts from a total of 2,198 companies.

- Using the dataset, we applied the proposed methodology to determine which criteria each listed company corresponds to mechanically.

- For each criterion, if a listed company contains text that satisfies the criterion, the listed company is considered to fulfill the criterion.


The Japan Exchange Group Inc. aims to understand the extent to which the climate-related information disclosures of Japanese companies comply with the TCFD recommendations and to provide assistance for listed companies disclosing their climate-related information.
To this end, it published its "Survey on the Reality of Information Disclosure in Compliance with TCFD Recommendations" in November 2021, which targeted 259 TCFD-endorsing listed companies (as of the end of March 2021), and the "Survey on the Reality of Information Disclosure in Compliance with TCFD Recommendations (Fiscal Year 2022)" in January 2023, which targeted constituents of the JPX-Nikkei Index 400.

Based on the classification results, a more detailed survey will be conducted in fiscal year 2023, and the results will be published.
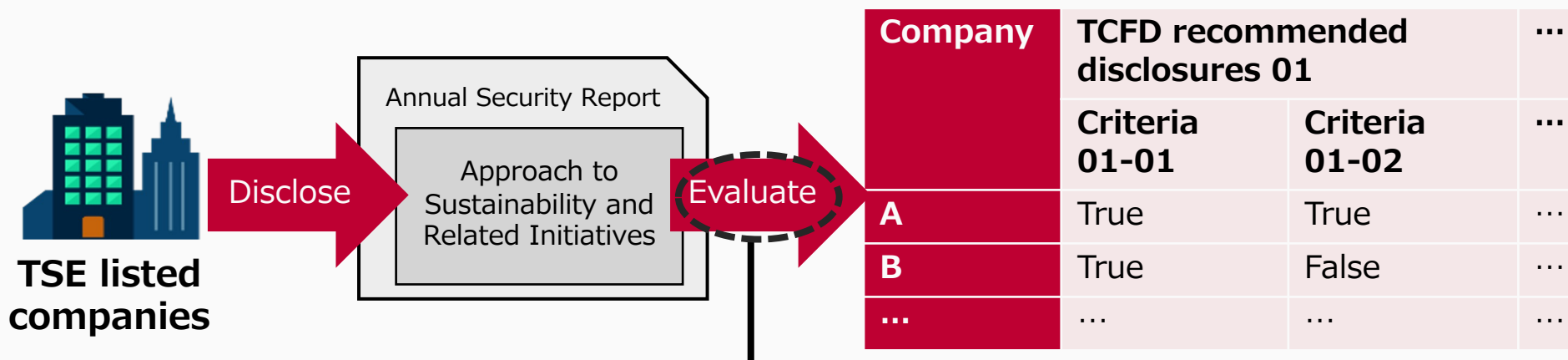
Fulfillment Trends for All Listed Companies

- Governance and Risk Management tend to be higher than other criteria.
    - This may be because these two components are required to be disclosed.

- The actual distribution of Strategy and Risk Management may be lower due to lower precision.
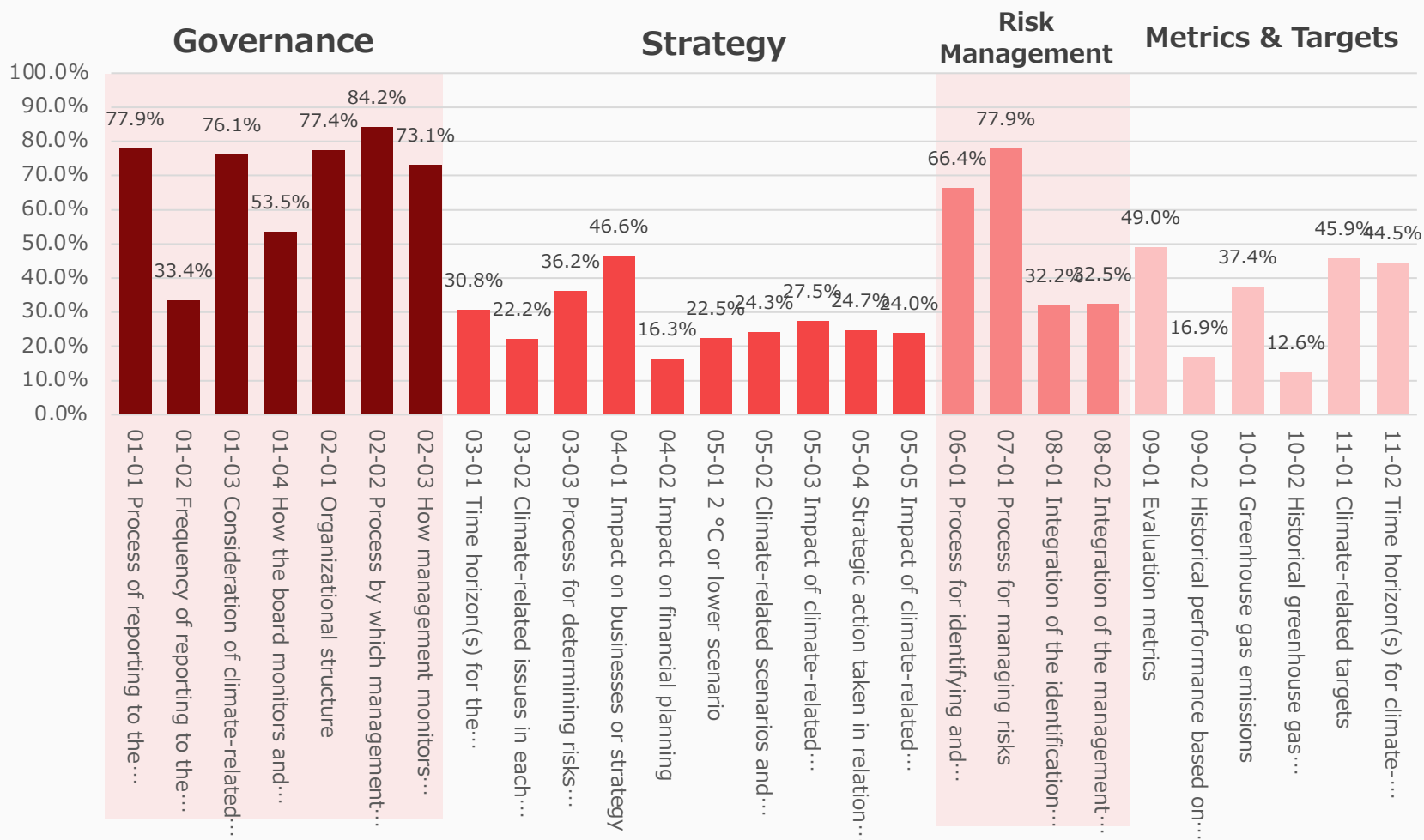
See GitHub for details on all criteria: https://github.com/cierpa/tcfd_criteria

Conclusion

- We proposed a method for classifying TCFD recommended disclosures by zero-shot text classification using LLMs and demonstrated the effectiveness of the proposed method.

- Future research is envisioned to include the following:
    - Continuous surveys of fulfillment status
    - Improvements in classification methods (including their criteria)
    - Expansion to disclosure media other than annual securities reports

- In addition, the proposed method can automate analyses of sustainability information disclosures, providing a foundation for further applications as follows:
    - Application to disclosures related to other ESG elements
    - Application to international disclosure standards

| Company | TCFD recommended disclosures 01 | | ... |
	Criteria 01-01	Criteria 01-02	...
A	True	True	...
B	True	False	...
...	...	...	...

TSE listed companies — Disclose → Annual Security Report: Approach to Sustainability and Related Initiatives → Evaluate

Zero-shot text classification with LLMs → evaluating all listed companies using the proposed method.

Appendix

By-category Results of the Classification Evaluation Experiments

ID	Number of fulfilled	GPT-3.5				GPT-4			
		Accuracy	Precision	Recall	F1-Score	Accuracy	Precision	Recall	F1-Score
01-01	69	71.0%	70.4%	100.0%	82.6%	92.0%	89.6%	100.0%	94.5%
01-02	38	40.0%	38.8%	100.0%	55.9%	94.0%	92.1%	92.1%	92.1%
01-03	70	72.0%	71.9%	98.6%	83.1%	94.0%	92.1%	100.0%	95.9%
01-04	47	53.0%	50.0%	100.0%	66.7%	83.0%	75.9%	93.6%	83.8%
02-01	66	68.0%	67.7%	98.5%	80.2%	84.0%	82.9%	95.5%	88.7%
02-02	71	71.0%	71.0%	100.0%	83.0%	89.0%	86.6%	100.0%	92.8%
02-03	66	68.0%	67.7%	98.5%	80.2%	91.0%	89.0%	98.5%	93.5%
03-01	14	44.0%	19.1%	92.9%	31.7%	95.0%	73.7%	100.0%	84.8%
03-02	5	55.0%	8.3%	80.0%	15.1%	96.0%	55.6%	100.0%	71.4%
03-03	9	38.0%	12.7%	100.0%	22.5%	92.0%	52.9%	100.0%	69.2%
04-01	13	31.0%	15.0%	92.3%	25.8%	89.0%	54.2%	100.0%	70.3%
04-02	5	55.0%	8.3%	80.0%	15.1%	98.0%	80.0%	80.0%	80.0%
05-01	11	74.0%	29.7%	100.0%	45.8%	100.0%	100.0%	100.0%	100.0%
05-02	7	83.0%	29.2%	100.0%	45.2%	96.0%	63.6%	100.0%	77.8%
05-03	8	68.0%	20.0%	100.0%	33.3%	96.0%	66.7%	100.0%	80.0%
05-04	7	62.0%	14.0%	85.7%	24.0%	96.0%	66.7%	85.7%	75.0%
05-05	8	63.0%	17.8%	100.0%	30.2%	95.0%	66.7%	75.0%	70.6%
06-01	50	51.0%	50.5%	100.0%	67.1%	87.0%	80.3%	98.0%	88.3%
07-01	62	62.0%	62.0%	100.0%	76.5%	86.0%	82.4%	98.4%	89.7%
08-01	18	24.0%	18.5%	94.4%	30.9%	88.0%	61.5%	88.9%	72.7%
08-02	21	37.0%	25.0%	100.0%	40.0%	88.0%	66.7%	85.7%	75.0%
09-01	25	66.0%	42.1%	96.0%	58.5%	94.0%	85.2%	92.0%	88.5%
09-02	6	48.0%	10.3%	100.0%	18.8%	98.0%	75.0%	100.0%	85.7%
10-01	20	79.0%	48.8%	100.0%	65.6%	98.0%	95.0%	95.0%	95.0%
10-02	6	72.0%	15.6%	83.3%	26.3%	98.0%	83.3%	83.3%	83.3%
11-01	24	79.0%	53.7%	91.7%	67.7%	93.0%	84.0%	87.5%	85.7%
11-02	23	68.0%	42.6%	95.8%	59.0%	95.0%	82.8%	100.0%	90.6%
Whole		59.3%	36.3%	95.8%	52.7%	92.8%	77.2%	94.4%	84.9%

Relationship between TCFD Recommended Disclosures and the Criteria

#	Core elements	Title of disclosures	Criteria
01	Governance	Board oversight	01-01: Process of reporting to the board on climate-related issues 01-02: Frequency of reporting to the board on climate-related issues 01-03: Consideration of climate-related issues by the board 01-04: How the board monitors and oversees progress
02	Governance	Management's role	02-01: Organizational structure 02-02: Process by which management is informed about climate-related issues 02-03: How management monitors climate-related issues
03	Strategy	Risks and opportunities	03-01: Time horizon(s) for the consideration of climate-related risks and opportunities 03-02: Climate-related issues in each specified time horizon 03-03: Process for determining risks and opportunities with a financial impact
04	Strategy	Impact on businesses, strategy, and financial planning	04-01: Impact on businesses or strategy 04-02: Impact on financial planning
05	Strategy	Description of resilience of strategy	05-01: 2 °C or lower scenario 05-02: Climate-related scenarios and associated time horizon(s) 05-03: Impact of climate-related scenarios on the strategy 05-04: Strategic action taken in relation to climate-related scenarios 05-05: Impact of climate-related scenarios on financial planning
06	Risk Management	Processes for identifying and assessing risks	06-01: Process for identifying and assessing risks
07	Risk Management	Processes for managing risks	07-01: Process for managing risks
08	Risk Management	Integration into overall risk management	08-01: Integration of the identification and assessment process into the overall risk management 08-02: Integration of the management process into overall risk management
09	Metrics & Targets	Metrics used to assess risks and opportunities	09-01: Evaluation metrics 09-02: Historical performance based on evaluation metrics
10	Metrics & Targets	Greenhouse gas emissions of Scope 1 and 2	10-01: Greenhouse gas emissions 10-02: Historical greenhouse gas emissions
11	Metrics & Targets	Targets used to manage risks and opportunities and performance against targets	11-01: Climate-related targets 11-02: Time horizon(s) for climate-related targets

Example of a prompt (Reference Translation)

Below are some disclosure materials of listed companies and the criteria for TCFD recommended disclosures.

Selected Disclosure Materials of Listed Companies
...

Criteria
Does the text describe the processes by which the board and/or the board committee are informed about climate-related issues?

Remarks
Examples of board committees could include an audit committee, risk committee, etc.
Climate-related issues refer to climate-related risks and opportunities.
Sustainability efforts are considered to be related to climate-related issues.
Content related to future plans will not be considered.

Task
Output True if some input listed company disclosure documents meet the Criteria, False otherwise.

Output

References

[1] TCFD (Task Force Clim. Relat. Financ. Discl.). Recommendations of the task force on climate-related financial disclosures. 2017.

[2] Alix Auzepy, Elena Tönjes, David Lenz, and Christoph Funk. Evaluating tcfd reporting: A new application of zero-shot analysis to climate-related financial disclosures, 2023.

[3] N. Doi, Y. Nobuta, and T. Mizuno. Topic classification of key audit matters in japanese audit reports by zero-shot text classification. In 2023 14th IIAI International Congress on Advanced Applied Informatics (IIAI-AAI), pages 540–545, Los Alamitos, CA, USA, jul 2023. IEEE Computer Society. doi: 10.1109/IIAI-AAI59060.2023.00108. URL https://doi.ieeecomputersociety.org/10.1109/IIAI-AAI59060.2023.00108.

[4] Nobushige Doi, Yusuke Oda, Naho Nakakubo, and Jun Sugimoto. Automated Determination of TCFD recommended disclosures through zero-shot Text Classification (in Japanese). pages 1279-1284, 3 2024.