

| Corporation ESG Grade Classifying model based on Financial Statements

Sci-Fi

Park Minseung

Data science
2019310065

Koo Minkyu

Psychology
2018310979

2023.11.03

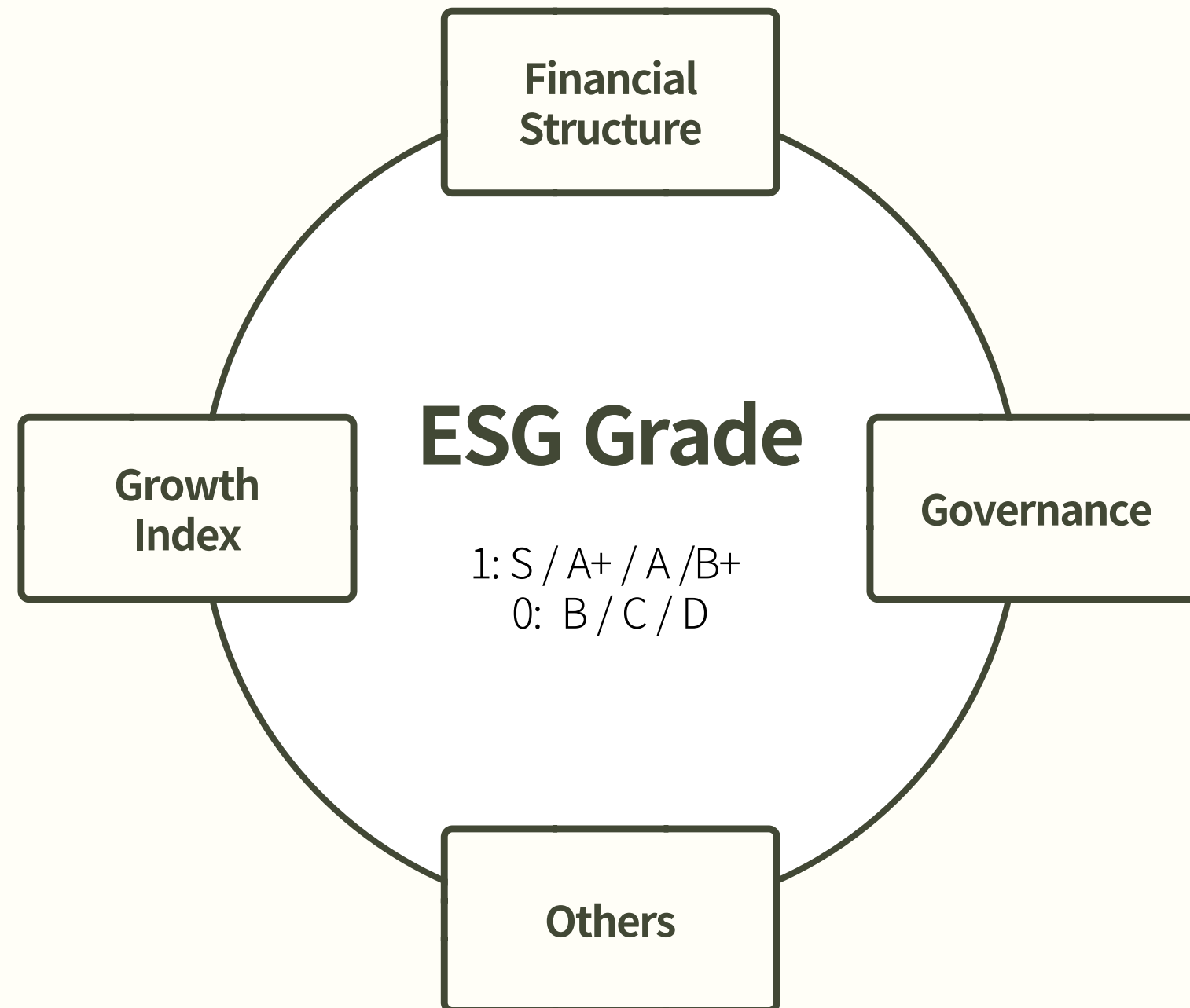
INTRODUCTION

Topic To classify domestic corporation **ESG Grade** based on financial statements

WHY ESG grades classifying model?

- ESG stands for Environmental Responsibility, Social Responsibility, and Governance which has become modern corporation's necessary management due to Upgrowing social needs About **Company's Roles**
- Many investment companies and National institutions take **Responsible Investment** about sustainable management into consideration when they decides to invest company
- We can predict company's **ESG Grade** based on some financial data in that company is tend to make upcoming ESG strategy according to its **Current Financial Status**
- Additionally, Financial index can be found as Key metrics impacting company's ESG activities

Literature Review



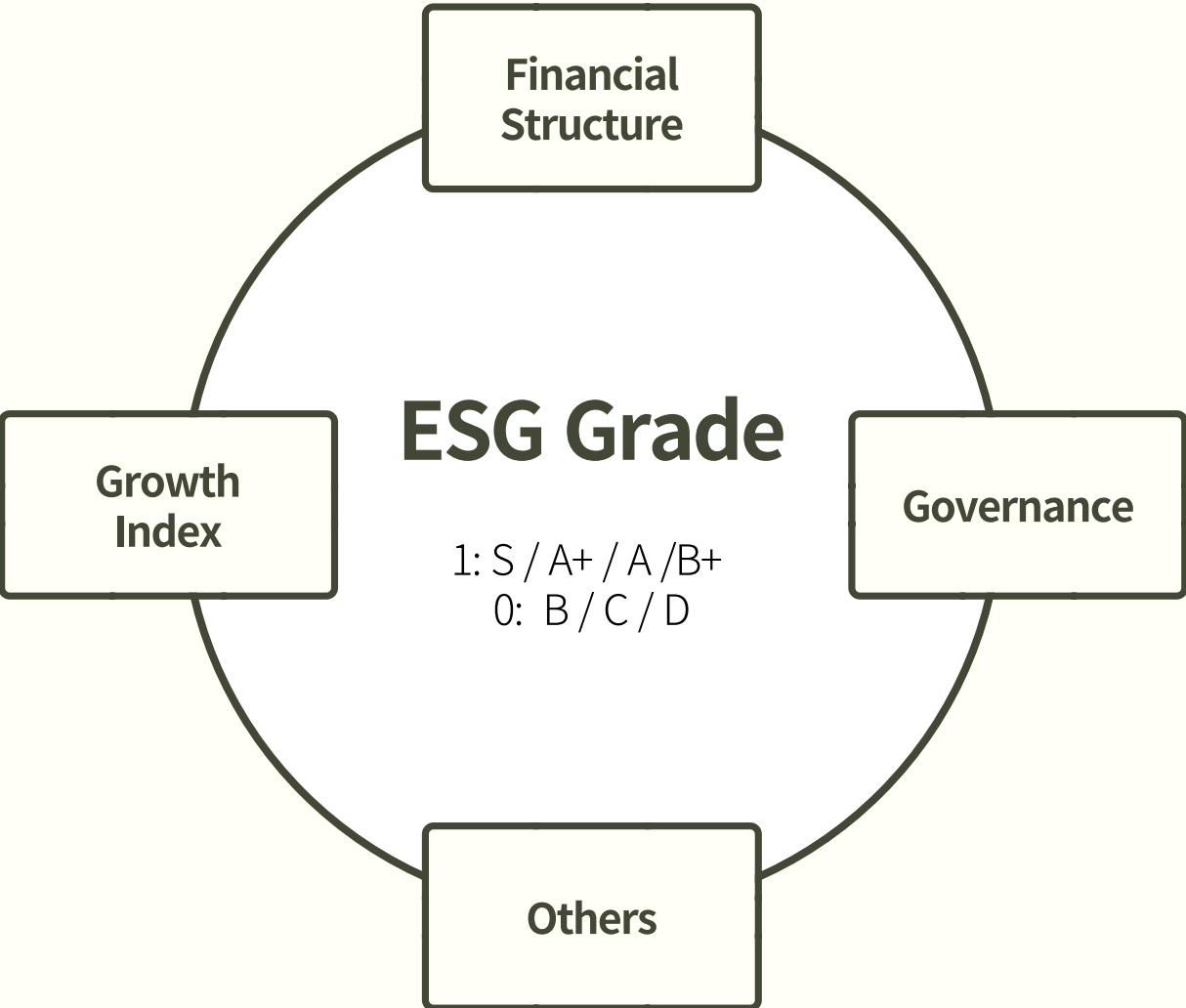
The authors built an algorithm that classifies corporate's ESG grade (2023.03.21.).

They collected numeric values representing corporate's financial statement as well as ESG overall rating offered by Korean Institute of Corporate governance and sustainability.

By considering past data from 2019 to 2021, they could obtain 1,780 rows with 13 columns

- Dataset: 1,780 rows x 13 cols
- Predictor Variable: 12 variables
- Target Variable: 1 variable (Binary)

Literature Review



〈표 2〉 심층신경망 기반 ESG 성과 예측모형의 학습데이터 구성

유형	구분	변수명	정의
학습변수	재무구조	SIZE _{t-1}	전기 기업의 규모 (기업의 총자산)
		OCF _{t-1}	전기 영업활동 현금흐름 (영업활동 현금흐름 / 총자산)
		LEV _{t-1}	전기 부채 비율 (총부채 / 총자산)
		INASSET _{t-1}	전기 무형자산 비중 (무형자산 / 총자산)
	성장성	SALES_G _{t-1}	전기 매출액 성장률 ((매출액 - t-1기 매출액) / 매출액)
		DIV_G _{t-1}	전기 현금 배당 성향 상승률 ((현금 배당 성향 - t-1기 현금 배당 성향) / 현금 배당 성향)
		EBIT_G _{t-1}	전기 EBIT 성장률 ((EBIT - t-1기 EBIT) / EBIT)
		EMP_G _{t-1}	전기 임직원 성장률 ((총 임직원수 - t-1기 총 임직원 수) / 총 임직원 수)
	지분구조	LARGE _{t-1}	전기 최대주주지분율
		FOR _{t-1}	전기 외국인투자지분율
	기타	OUT _{t-1}	전기 사외이사비율 (사외이사 수 / 전체 임원 수)
		REPORT_AVAILABLE _{t-1}	전기 지속가능경영보고서 공시 여부에 대한 가변수
학습목표	등급결과	GRADE _t	당기 ESG 통합평가등급의 양호여부 (Positive: 1, Negative: 0)

주1) 현금배당성향 = 현금배당액 / 당기순이익

주2) EBIT = 세전영업이익 + 이자비용

Overall Plan

Plan

- Follow thesis paper's methodology using the same Variables
- Add the number of data instances by expanding the period and collecting past data
- Extract additional Financial Features according to other papers

Insight

1. Highly-Accurate classifying ML model

2. The Important Features

Workflow & Division

**Topic selection
& Planning
& Project Proposal**

Koo Minkyu

**Dataset
Preparation**

Park Minseung

**Model Selection &
Training**

ALL

**Evaluation &
Parameter Tuning**

ALL

Problem Statement

Problem

- To classify domestic corporation ESG grade based on financial statements
- To Find important variables that impacts ESG activities

Approach

- Broader approach than Thesis Paper
- ML algorithm that predicts Future ESG overall grades based on corporation's financial statement

Dataset (2020~2023)

- Financial statements from DART(Data Analysis, Retrieval and Transfer System)
- ESG grades By Korean Institute of Corporate governance and sustainability

Hypothesis

- 1) The Higher Financial Structure and Growth index, The Higher ESG Grade
- 2) Executive Growth and the Ratio of outside executives will be the powerful features

Technical Approach: Multiclass Classification

Algorithms to use

	Logistic Regrassion	RandomForest	DNN
Accuracy	0.xxx	0.xxx	0.xxx
F1-score	0.xxx	0.xxx	0.xxx
AUC-ROC	0.xxx	0.xxx	0.xxx

Limitation

- Low number of whole domestic companies
- Company Data instances' dependency issue when retrieving past record