Continuous Audit at Insurance Companies

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<u>Outline</u>

- ☐ Objectives
- ☐ Scope
- ☐ Methods
- ☐ Research Framework
  - ■ A Rule-based model for Anomaly Detection
  - ■ Clustering
- ☐ Q&A

<u>Objectives</u>

- ☐ Creating an architecture for a future continuous audit of the systems in question

- ☐ Assisting the audit with analytical support

- ☐ Creating system specific filters of eventually preventive nature

<u>Scope</u>

☐ Historical disbursements & claims data to develop filters that may detect fraud, discrepancies and internal control weaknesses

☐ Maturity Model
  ■ Automated Continuous Audit
  ■ Continuous Control Monitoring

Methods

An evolving continuous audit framework

- Automation
- Sensoring
- ERP
- E-Commerce

Continuous Risk Monitoring and Assessment

Continuous Data Audit

Continuous Control Monitoring
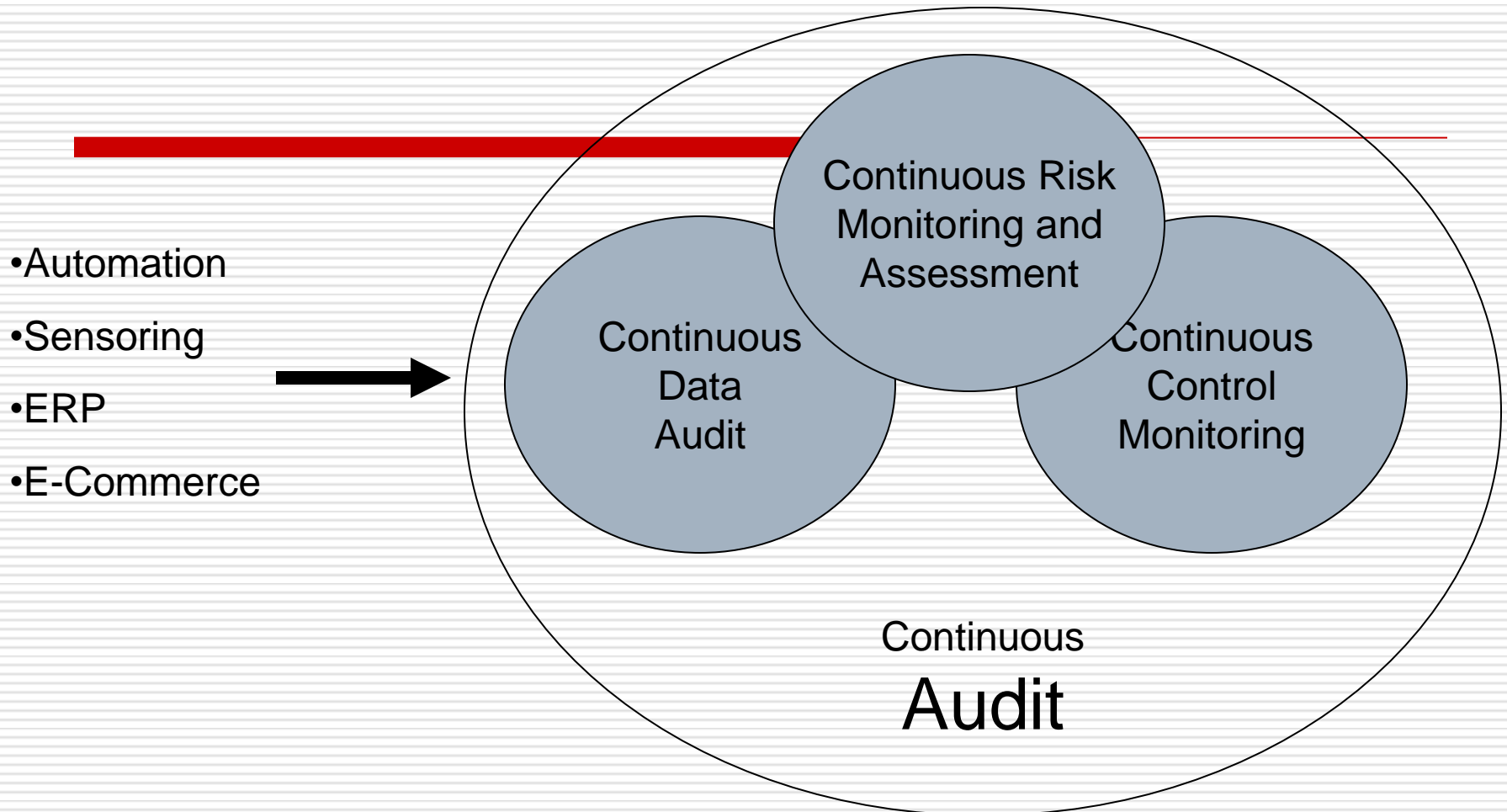
Continuous

Audit

Steps in the continuous forensic and audit process

1. Identify system and understand its structure and features
2. Capture relevant data
3. Clean and scrub data
4. Create KPI and extraction models
5. Run models under different scenarios
6. Examine the exceptions found on an interactive basis
7. Decide on profile of risk

__Cont.__

8. Place filters in the entrance of processes
9. Create an audit by exception mechanism within the internal audit organization
10. Create interfaces between management continuous monitoring and audit by exception
11. Continue the forensic model development process based also on the filtering results
12. Work on external audit reliance on the process

Framework

A Rule-Based model for Anomaly Detection
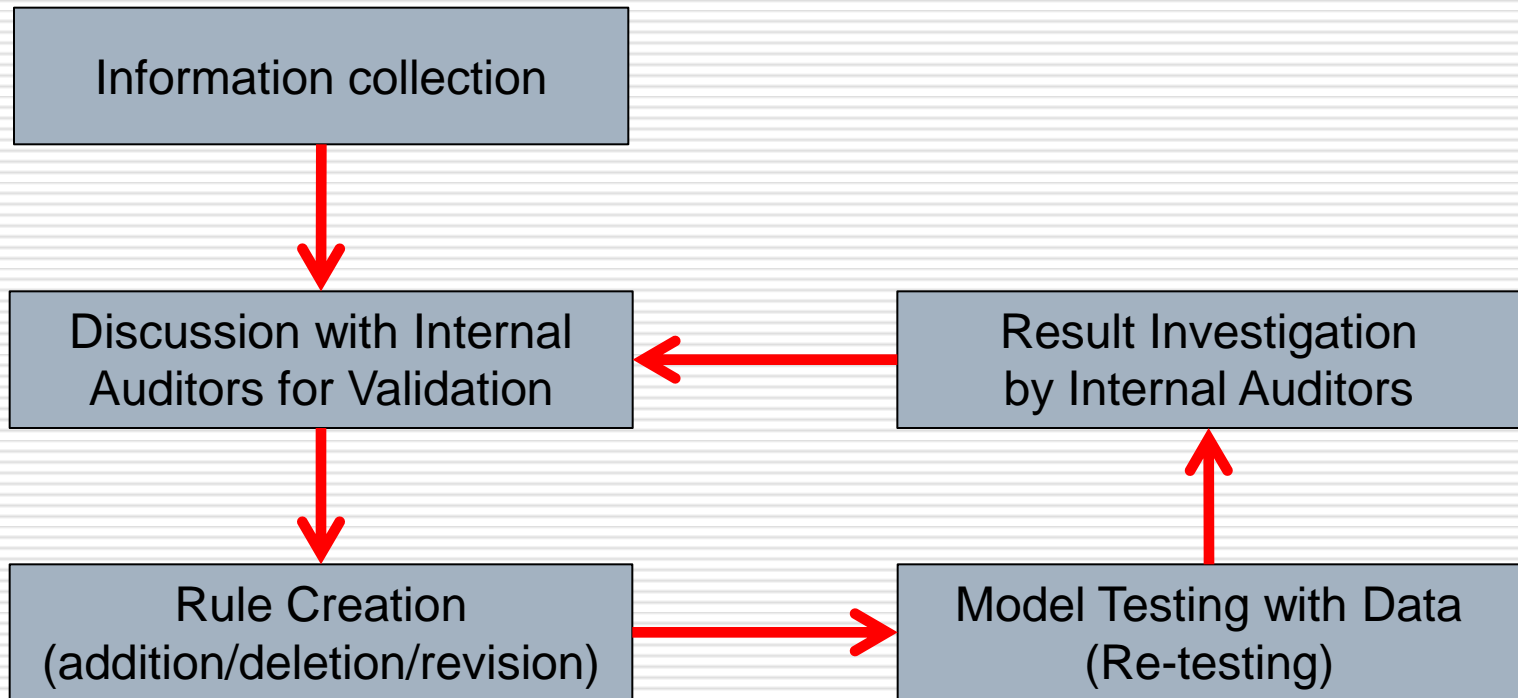
Research Question

- ☐ Prior Research
  - ■ Focuses on fraud by outsiders such as customers, criminals, and intruders (→ external fraud).
    - → Little research on Internal Fraud
  - ■ Highly depends on 'labeled/classified' data.
    - ☐ Known internal fraud examples are rarely documented and disclosed.
    - → Unsupervised method of profiling
  - ■ Practicability
    - ☐ Rarely considers actual implementation by internal auditors
    - → Rule-based indicators and suspicion scoring system

- ☐ How can we develop a rule-based model to detect abnormal (internal fraudulent/erroneous) wire transfers?
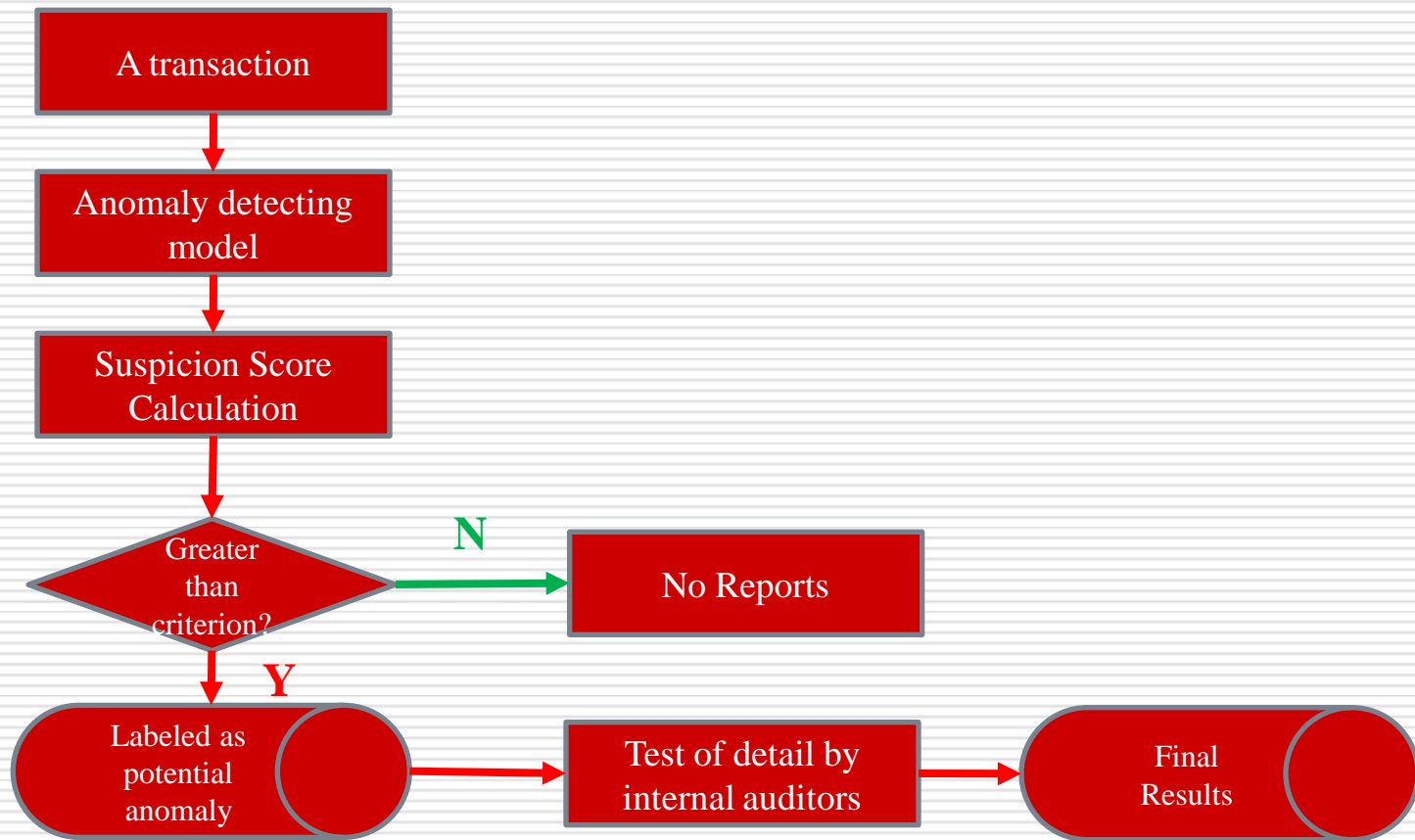
Obstacles to Anomaly Detection

- ☐ Anomaly (including internal fraud) detection
    - ■ When anomaly prevention fails (how to know?).
    - ■ Detects in a timely manner (or at least not too late, especially for internal fraud).
    - ■ Too small number of anomaly cases.

- ☐ Continuous Auditing/Monitoring process
    - ■ Unawareness that the anomaly prevention control has failed.
    - ■ Highly adaptive existing fraudsters (=fraud perpetuators) and New comers.
    - ■ Cost of undetected anomaly (esp. internal fraud) is significant.

Model Development Process

```
Information collection
        │
        ▼
Discussion with Internal    ◀──  Result Investigation
Auditors for Validation          by Internal Auditors
        │                                 ▲
        ▼                                 │
Rule Creation              ──▶    Model Testing with Data
(addition/deletion/revision)      (Re-testing)
```

Note. (   ): After the first round

Anomaly Detection Process

A transaction

↓

Anomaly detecting model

↓

Suspicion Score Calculation

↓

Greater than criterion?

N → No Reports

Y

↓

Labeled as potential anomaly → Test of detail by internal auditors → Final Results

Indicators Category

- ☐ 21types (38 indicators) of anomaly indicators.
    - ■ Purport to identify abnormally low or high values, abnormally positive slope, or abnormally different from population norms.

- ☐ Conditional tests
    - ■ Pass/Fail or Yes/No types
    - ■ Some of them are directly related to controls.

- ☐ Statistical tests
    - ■ PI/CI, Frequency test, Correlation test, or Clustering
    - ■ Developed by using either prediction intervals, correlation, or clustering.

Anomaly Indicators: Example
(Note. All the examples are fictitious.)

Questions	Possible Filtering rules to test
The payee transactions payment amount is out of the range of payment amounts.	Amount range for each payee (or all payees) & check outliers.
The payee transaction payment trend line over time has a positive slope.	Correlation between date (or sequence numbers) and payee amounts for each payee
The payee is an outlier to payee baseline activity. (Send to a payee that normally do not send to)	Payee frequency by each initiator & check the payees that have the least frequencies.
The transaction amount is out of range of normal activity from this bank account.	The 90, 95, and 99 PI amts for each sending/receiving bank account and check the exceptions.
The transaction initiator is not a normal sender from this bank account.	First, check the list of sender bank account, then create exception list of initiators by sending bank account.
The transaction payee is not a normal receiver from this bank account.	A list of payees by sending banks who have least frequency:

Suspicion Scores
(All the numbers are fictitious.)

Statistical score	All wires	Last Qtr only
0	197505	52574
1	7943	2092
2	1867	485
3	762	281
4	150	92
5	12	10
6	2	4

Total score	All wires	Last Qtr only
0	81922	32666
1	101384	18227
2	17596	2824
3	5772	1425
4	1072	266
5	384	84
6	83	32
7	21	7
8	5	5
10	2	2

Conditional score	All wires	Last Qtr only
0	86613	34472
1	102686	17787
2	14063	2183
3	4327	987
4	402	80
5	133	22
6	15	3
7	2	4

If Target Flags are between 25 and 30, 5 for Statistical, 6 for Conditional, and 7 for Total scores.

Examples of Flagged Wires

wireID	amount	Statistical score	Conditional score	Total score
10	950,000	5	0	5
25	22,600,000	5	1	6
33	4,000	0	6	6
42	11,500,000	5	2	7
50	8,200,000	2	5	7
52	600,000,000	3	5	8
63	85,000,000	6	7	13

Contribution

☐ Proposes developing a detection model of internal fraud with unlabeled/unclassified data.

☐ Describes the development process of an anomaly detection model that is implementable by internal auditors.

☐ Shows that developing process of anomaly detection model can help internal auditors to identify weakly-controlled areas and thus provide additional assurance.

Limitations and Future Study

- ☐ Limitations
  - ■ False negatives may exist in model development.
  - ■ Some anomaly indicators may not be applicable to the other companies.

- ☐ Future Study
  - ■ Needs more fine-tuning, that is, specification and customization to consider transactional characteristics.
  - ■ Thus, Next step will examine the relevance of relevant attributes. If relevant and effective, they will improve the current model.

Clustering For Anomaly Detection

Insurance Claims

☐ **Objective**

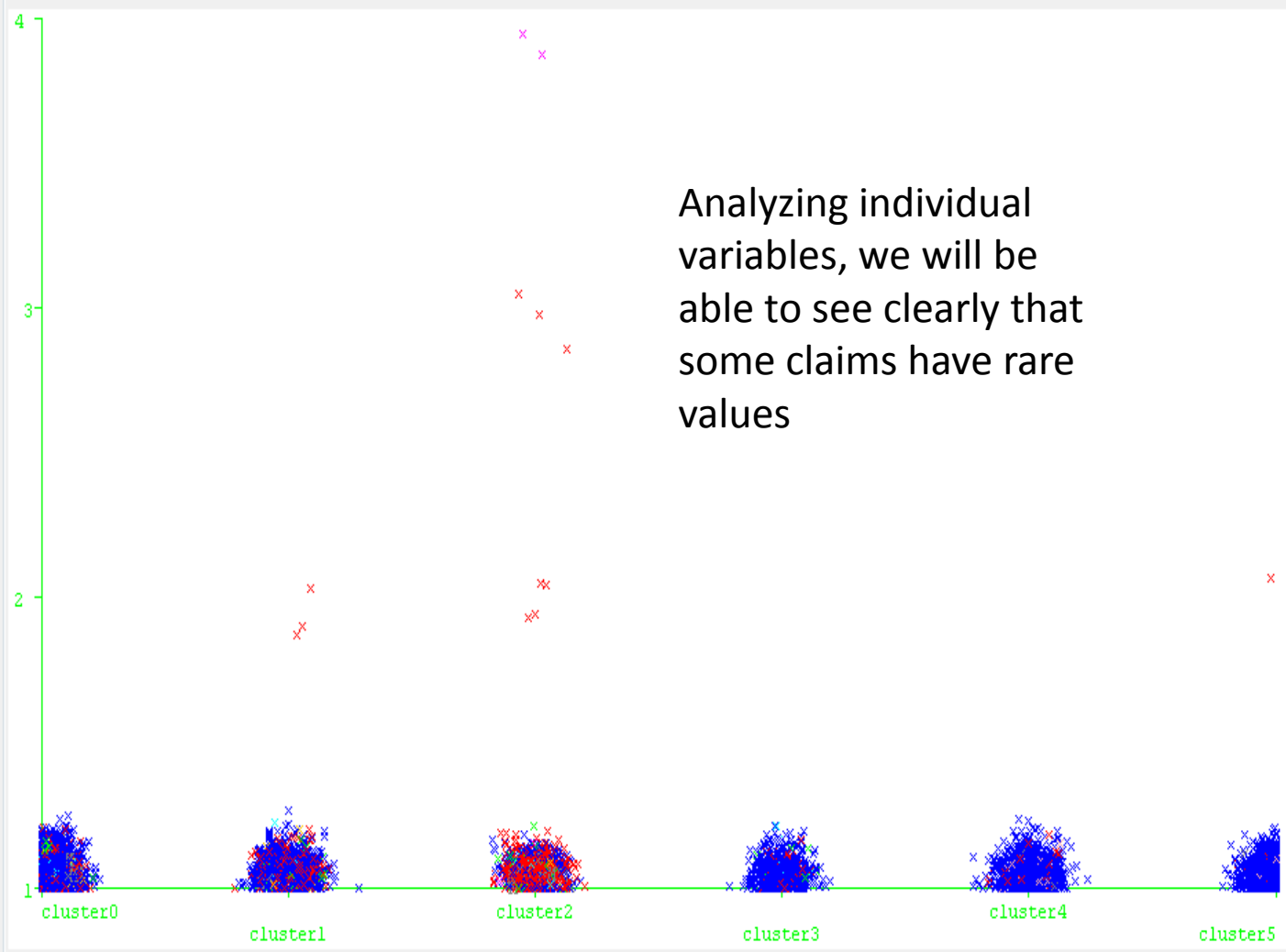■ To detect potential fraud or errors in the claims process by using clustering techniques

☐ **Steps in Cluster Analysis**

■ **Selecting attributes**

■ **Selecting distance measurement**

■ **Selecting cluster techniques**

■ **Analyzing the resulting clusters**
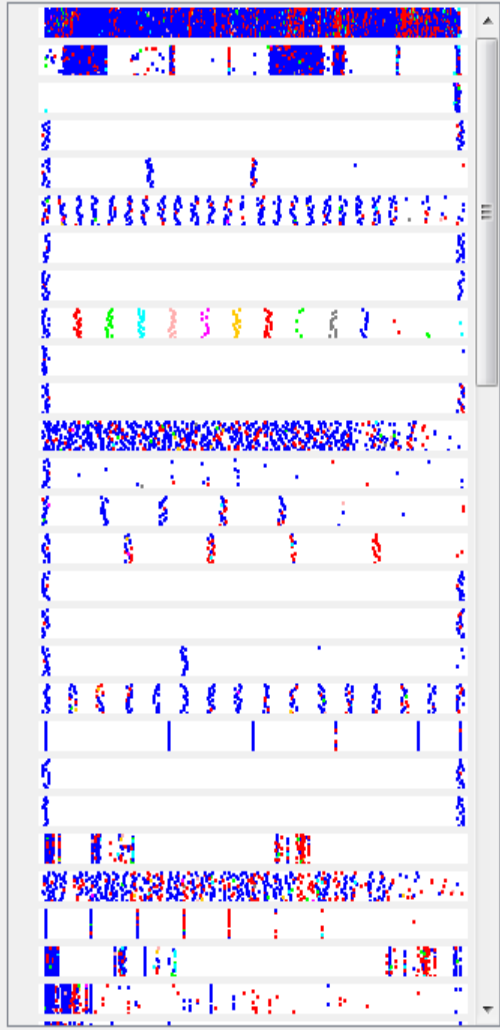
■ **Identifying anomaly and/or outliers**

Visualizing combination of attributes, we will be able to see similarity and differences among claims

Analyzing individual variables, we will be able to see clearly that some claims have rare values

Contribution

- ☐ Clustering can be used to build a model for anomaly detection when the labeled data are not available.

- ☐ It may help to discover some hidden pattern or clusters in the dataset.

<u>Limitations and Future Study</u>

☐ Cluster Analysis always generates clusters, regardless of the properties of the data-set.

☐ The interpretation of the results might not be clear.

☐ How to define anomaly could also be a problem.

<u>Thank you for your attention!</u>