Audit Analytics

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ISACA New York 2013
What is Audit Analytics

The use of data analysis technology in Auditing.

Audit analytics is the process of identifying, gathering, validating, analyzing, and interpreting various forms of data within organization to further the purpose and mission of auditing.

It can also assists audit departments in fulfilling their responsibilities to evaluate and improve the governance, risk management, and control (GRC) processes as part of the assurance function.
Benefit of Audit Analytics

- **Productivity and cost savings**
  - broaden the scope of their assurance activities
  - reduce of staff necessary to complete the audit plan

- **Efficiency in data access**
  - auditors can access and query data by themselves

- **Audit risk**
  - significantly reduce audit risk by honing the risk assessment and stratifying the population
### The Evolving Role of Audit Analytics

<table>
<thead>
<tr>
<th>Past</th>
<th>Now</th>
<th>Future</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specialized technology</td>
<td>Essential technique</td>
<td>Integrated throughout the audit process</td>
</tr>
<tr>
<td>The domain of specialized IT auditors</td>
<td>Valuable in the majority of audit procedures</td>
<td>All auditors to have an appropriate level of technological competency</td>
</tr>
</tbody>
</table>
## Approaches to Audit Analytics

<table>
<thead>
<tr>
<th></th>
<th><strong>Ad Hoc</strong></th>
<th><strong>Repetitive</strong></th>
<th><strong>Continuous</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Explorative</strong></td>
<td>Explorative and investigative in nature.</td>
<td>Periodic analysis of processes from multiple data sources.</td>
<td>“Always on” — scripted auditing and monitoring of key processes.</td>
</tr>
<tr>
<td><strong>Seeking</strong></td>
<td>Seeking documented conclusions and recommendations.</td>
<td>Seeking to improve the efficiency, consistency, and quality of audits.</td>
<td>Seeking timely notification of trends, patterns and exceptions.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Supporting risk assessment and enabling audit efficiency.</td>
</tr>
<tr>
<td><strong>Specific</strong></td>
<td>Specific analytic queries — performed at a point in time — for the purpose of generating audit report findings.</td>
<td>Managed analytics — created by specialists — and deployed from a centralized, secure environment, accessible to all appropriate staff.</td>
<td>Continual execution of automated audit tests to identify errors, anomalies, patterns and exceptions as they occur.</td>
</tr>
</tbody>
</table>
Applications of Audit Analytics

- Analytical Review
- Controls Assessment and Testing
- Substantive Testing
- Fraud Detection
- General Analysis and Reporting
- Financial and Non-financial Transactions
Data analysis in audit cycle

The analytic routines and the results they generate should be included in the audit review.

Analyze entire population instead of sampling to increase overall departmental efficiency and allow for greater insight into high risk areas.

Define and create an audit plan that focuses on the areas of highest concern.

Avoid delay of data access.
Using Data Analysis Technology

Use of Data Analytic Technologies

- Spreadsheets
- Databases
- Purpose-built Data Analysis Technologies
- Other

Control Analysis
Data Analysis
Substantive Testing
Continuous Controls Monitoring
Continuous Auditing
Understanding Clients’ Data
-- Descriptive statistics & Visualization

Descriptive statistics
- Sum
- Mean
- Max
- Min
- Standard deviation
- Count number
- Frequency

Visualization
- Histogram
- Graphing
Basic Analytical Techniques

- Summarization
- Classification
- Stratification
- Age Analysis
- Duplication Testing
- Gap Testing
- Benford’s Law
Application of the basic analytical techniques in auditing

- Accounts receivable audit (demonstration in ACL)
  - Age analysis
  - Analyze the balances by account

- Accounts Payable audit (demonstration in IDEA)
  - Analyze the profile of payments
  - Test for duplicate payments
  - Searching for gaps in the check Number Sequence
Age analysis in ACL

<table>
<thead>
<tr>
<th>Days</th>
<th>Count</th>
<th>Percent of Count</th>
<th>Percent of Field</th>
<th>GROSS_AMT</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 30</td>
<td>167</td>
<td>55.67%</td>
<td>53.47%</td>
<td>233,037.89</td>
</tr>
<tr>
<td>31 - 58</td>
<td>93</td>
<td>31%</td>
<td>28.23%</td>
<td>123,058.59</td>
</tr>
<tr>
<td>59 - 89</td>
<td>37</td>
<td>12.33%</td>
<td>17.05%</td>
<td>74,303.08</td>
</tr>
<tr>
<td>90 - 121</td>
<td>2</td>
<td>0.67%</td>
<td>0.72%</td>
<td>3,119.75</td>
</tr>
<tr>
<td>&gt;121</td>
<td>1</td>
<td>0.33%</td>
<td>0.54%</td>
<td>2,345.54</td>
</tr>
<tr>
<td>Totals</td>
<td>300</td>
<td>100%</td>
<td>100%</td>
<td>435,864.85</td>
</tr>
</tbody>
</table>
Analyze the balances by account in ACL
Analyze the balances by account in ACL
Analyze the profile of payments in IDEA
Test for duplicate payments in IDEA

### Duplicate Key Detection
- **Output Duplicate Records**
- **Output Records Without Duplicates**
- **Criteria:**
- **File name:** Duplicate

### Define Key
- **Base index on:** NEW INDEX
- **Field** | **Direction**
  --- | ---
  SUPPNO | Ascending
  AMOUNT | Ascending

### Fields to include:
- SUPPNO
- PAYEE
- INVOICE
- INV_DATE
- AMOUNT
- CHECK
- PAY_DATE
- AUTH

<table>
<thead>
<tr>
<th>SUPPNO</th>
<th>PAYEE</th>
<th>INVOICE</th>
<th>INV_DATE</th>
<th>AMOUNT</th>
<th>CHECK</th>
<th>PAY_DATE</th>
<th>AUTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>M100</td>
<td>M Cash Inc</td>
<td>UP-76409</td>
<td>2008/10/1</td>
<td>75,000.00</td>
<td>701774</td>
<td>2008/10/6</td>
<td>HMV</td>
</tr>
<tr>
<td>M100</td>
<td>Cash Inc</td>
<td>CS - 717 -97</td>
<td>2008/9/13</td>
<td>75,000.00</td>
<td>701728</td>
<td>2008/9/15</td>
<td>VST</td>
</tr>
<tr>
<td>M100</td>
<td>Co Cash Inc</td>
<td>T5352</td>
<td>2008/10/17</td>
<td>75,000.00</td>
<td>701849</td>
<td>2008/10/20</td>
<td>V.S.T</td>
</tr>
<tr>
<td>P007</td>
<td>Nellie Dunn</td>
<td>000528CJW</td>
<td>2008/6/24</td>
<td>145.50</td>
<td>701531</td>
<td>2008/7/19</td>
<td>VST</td>
</tr>
<tr>
<td>P007</td>
<td>Nellie Dunn</td>
<td>000526CJW</td>
<td>2008/6/10</td>
<td>145.50</td>
<td>701490</td>
<td>2008/7/10</td>
<td>CW</td>
</tr>
</tbody>
</table>
Searching for gaps in the check Number Sequence in IDEA

Gap Detection

Field to use: CHECK
Criteria: 

Numeric:
- All
- Range

Starting key value: 701,001
Ending key value: 702,001
Gap increment: 1

Output:
- Create database
- Create result

File name: Gap Detection
Result name: Gap Detection

From: CHECK | To: CHECK | Number
---|---|---
701,805 | 701,805 | 1
701,997 | 702,000 | 4

Total number of items detected: 5
Total number of gaps detected: 2
Advanced Analytical Techniques

- Regression
- Cluster Analysis
- Text Mining
- Process Mining
- Continuous Data Assurance
- .......
A simple regression application
Sales (test variable) vs. Cost of Sales (predicting variable)

To form the expectation a regression function is developed based on the audited base data (two prior years in this case). The function depicted is:

\[ Y = 29.56 + 1.5951X \]

Next, Recorded Sales for the current period (\( \times \)) are compared with Estimated Sales predicted by the regression model.

\[ \text{Recorded} - \text{Estimated} = \text{Residual} \]
Cluster analysis
Text mining

Process Employed to Mine Enron Email Data

1. Email Acquisition
   - > 1m emails

2. Pre-processing
   - ~200k emails

3. Filtering
   - Aid4Mail
   - 8225 emails

4. Social Network Analysis
   - NodeXL

5. Review Emails

Review and Revise
Process mining

INTERNAL FRAUD RISK REDUCTION

Descriptive Data Mining

Audit by domain experts:
- extreme values
- fraud
- circumventing procedures
- errors/mistakes

Fraud Detection & Fraud Prevention

Opportunity

Fraud Risk

Rationalisation
Incentive/Pressure

Domain Experts

Process Mining

Select business process with advanced IT integration

Data collection, manipulation and enrichment

Domain Knowledge

Transformation of data
A new certificate in “Audit Analytics”

Tentative courses:
- Audit Analytics
- Special Topics in Audit Analytics
- Information Risk Management
- Individual Study Course

MACCY students may specialize in the area taking these courses as optionals

Non-enrolled students may take the 4 course certificate independently
Audit Analytics

Purpose

Meet the demand for effective and efficient audit methodologies in profession.
Provide theoretical foundation and applied demonstration for advanced audit methodologies.

Objectives:

Gain a managerial overview of various analytical techniques
Gain understanding of the evolving scenario of big data audit
Perceive the progressive convergence of analytical methods, information processing, and auditing
Link audit analytics to corporate continuous monitoring and business process support
Domains of knowledge to be attained

- Analytics techniques in the audit domain
- The usage of audit analytics tools (ACL&IDEA)
- The usage of statistical software (paid or public; SAS, WEKA, R for example)
- Data extraction methods
- Statistical inference and its usage in auditing
Analytical techniques to cover

- Descriptive statistics
- Basic data analysis
- Benford’s law
- Clustering
- Text mining
- Continuity Equations
- Association Analysis
- Data Visualization
- Duplicate analysis
- Sampling
- Classification
- Regression
- Neural Network
- Process mining