Real World Implementations of Two Data Forensics Indices:
Approximation Response and Score Similarity Analyses
Panel Introductions

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Agenda

• Introduction of Approximation Score Similarity Index and Response Similarity Index (aSSI & aRSI)
• Importance of a Security Policy
• 3-4 Real World Scenarios
• Panel Q&A
• General Q&A
Approximation Score and Response Similarity

Actionable

Near real-time

Because we can
aSSI/aRSI

- **Collusion** statistics designed to identify **pairs of test takers** with unusually high number of matching scores or responses
- They **approximate** “true” score similarity and response similarity index
  - Do not require IRT or item level data
  - They use:
    - test taker percent correct scores,
    - item count,
    - a weight,
    - the count of matching scores or responses...
    - ...that’s it!
- **Near real time**
Math stuff...

\[ aSSI = \text{z-score (for persons 1 and 2)} \]

\[ Z_{12} = \frac{(M_{12} - E^{*}_{12})}{\sqrt{npq}} \], where

- \( M \) is count of observed matches
- \( n \) is the number of items
- \( p \) is \( E^{*}_{12} / n \) and \( q \) is \( 1 - p \)
- \( E^{*}_{12} \) is the adjusted expected value:

\[ E^{*}_{12} = n \cdot [s_1 s_2 + (1 - s_1)(1 - s_2)] + n \cdot b(1 - |s_1 - s_2|)(1 - |s_1 + s_2 - 1|) \]

where, \( s_i \) is proportion correct score for person \( i \), \( b \) is an adjustment to the magnitude of the correction set at 12.5%
True Positives

- aSSI 1%
- True SSI 1%
- aSSI 5%
- True SSI 5%

% of pairs with pre-knowledge correctly identified

Percent of Exposed Content
Prevention
Mitigation
Detection
Enforcement

Systematic Security
Enforcement

- Written security policy
- Candidate agreements
- Non-disclosures
- Appeals process
- Multiple sources evidence
- Legal
Scenario 1 – Potential breach with a Group of Test Takers

- CertMetrics flags 7 candidates for aSSI and aRSI
  - 5 who took the exam on the same day
  - 2 who took the exam form the prior week
- 5 of 7 flagged for passing in under 10 mins
- All 7 were placed in a Review queue
• Same low volume country
• Same company
• Average expected: 62%
• Average matching: 92% of responses!!!
Measures based on those at risk

Measures based on those not at risk

Differential Item Functioning

- Not Flagged
- Ridiculously High
- Stupid High
- Extremely High
- Very High
- High
Scenario 2 – Found Content Exposed on the Internet

- Received an internal tip from an employee
  - “I was direct messaged on the WeAllChatt App claiming that this person could guarantee I would pass the exam if I purchased their materials”
- Conducted an investigation
  - Identified several items on a current live form
- Did not have security scripts.
Only a small percent of people
With scripts turned on, they would have identified the problem MONTHS earlier
Scenario 3 – Mass Exposure Issue

• Three-day testing event held at conference in Las Vegas
• ¼ of the candidates identified as anomalous behavior
  • Flagged for aSSI and aRSI
  • Clustered into subsets
  • Flagged too little time
  • Flagged for Differential Person Functioning (DPF)
General Panel Questions
Panel Questions

What do you think is the biggest security concern right now?
Panel Questions

Where do you see the future of exam security going?
CertMetrics can run aSSI and aRSI, daily, on import of exam data. How does the use of these statistics run daily impact you, your program, and the industry?
Panel Questions

We have all been in the certification space for a while now but if we could give our younger selves some advice on exam security what would be your number one piece of advice?
Questions??
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