Logs simulator for fraud detection in mobile payments

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Introduction:
- Scarce test data for the study of fraud detection algorithms
- Unknown groundtruth in real data
- Need to evaluate the results of MASSIF (FP7 EU project) with test data

Aim:
- Model a Mobile Money Transfer System and its users
- Generate synthetic logs

Mobile Money Transfer System:

User behavior model:

Legitimate users model
A behavior is a set of habits which are characterized by a type of transaction, a bivariate normal distribution of transaction amounts and time between two transactions, a beginning and an end.

\[ \text{Habit}_t = (\text{Type}, N_2(\mu, \Sigma), \text{Begin}, \text{End}) \]

Fraudulent users model
- Behavioral fraud: Exploitation of vulnerabilities to take over a legitimate user’s account. The account is used concurrently by the user and the fraudster. Behavior shifts are observed.
  - Example: A botnet is deployed on several phones. Periodically, a transfer of small amount (< 20) is made to a mule who withdraws the money shortly after.

Method:
- Create complex logs from the behavior of individuals (H 2)
- Payment platform model
  - Front / Back Office
  - Security Database
- User’s behavior model
  - Legitimate users
  - Fraudulent users

Model validation (Preliminary results)
These results were obtained by considering 4277 pairs of users and transaction types over 3 months of real data.

Transaction type | MD | MW | C2C | MP | AR | ALL
---|---|---|---|---|---|---
Number of transactions (%) | 12 | 5 | 3 | 6 | 31 | 18
Total Transaction Amount (%) | 14 | 11 | 19 | 2 | 21 | 23
Total Transaction Amount(%) | 3 | 3 | 3 | 3 | 3 | 5

These results were obtained by comparing the behavior of 35 users during 3 months with their model in the simulator. The accuracy measures correspond to the symmetric mean absolute percentage.

Conclusion and perspectives:
- Basis of two demonstrators for the MASSIF project review by the European Commission (October 2012, November 2013)
- Enhance user behavior model and fraud scenarios

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Table:

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<th>Transaction Type</th>
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<th>MP</th>
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