

Användning av maskininlärning för att stävja penningtvätt med kryptovalutor

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CGI



Vem är jag?

- Civilingenjör i Datateknik från KTH
- Internationell uppmärksamhet för min forskning inom hur maskininlärning kan användas för att stävja penningtvätt som görs med kryptovalutor
 - Publicering i Journal of Money Laundering Control
 - Uppmärksammas av media: Realtid och Computer Sweden
- IT Konsult på CGI
 - Blockkedjeteknik, Kryptovalutor, Maskininlärning
 - Systemförvaltare inom Mainframe/COBOL



Combating money laundering with machine learning – applicability of supervised-learning algorithms at cryptocurrency exchanges

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Abstract

Purpose – This study aims to explore how to denonymize cryptocurrency money launderers with the help of machine learning (ML). Money is laundered through cryptocurrencies by distributing funds to multiple accounts and then reexchanging the crypto back. This process of exchanging currencies is done through cryptocurrency exchanges. Current preventive efforts are outdated, and ML may provide novel ways to identify illicit currency movements. Hence, this study investigates ML applicability for combating money laundering activities using cryptocurrency.

Design/methodology/approach – Four supervised-learning algorithms were compared using the Bitcoin Elliptic Dataset. The method covered a quantitative analysis of the algorithmic performance, capturing differences in three key evaluation metrics of F1-scores, precision and recall. Two complementary qualitative interviews were performed at cryptocurrency exchanges to identify fit and applicability of the algorithms.

Findings – The study results show that the current implemented ML tools for preventing money laundering at cryptocurrency exchanges are all too slow and need to be optimized for the task. The results also show that while not one single algorithm is most suitable for detecting transactions related to money-laundering, the specific applicability of the decision tree algorithm is most suitable for adoption by cryptocurrency exchanges.

Originality/value – Given the growth of cryptocurrency use, this study explores the newly developed field of algorithmic tools to combat illicit currency movement, in particular in the growing arena of cryptocurrencies. The study results provide new insights into the applicability of ML as a tool to combat money laundering using cryptocurrency exchanges.

Keywords Anti-money laundering, Machine learning, Supervised learning, Algorithms, Cryptocurrency

Paper type Research paper

Vi är CGI

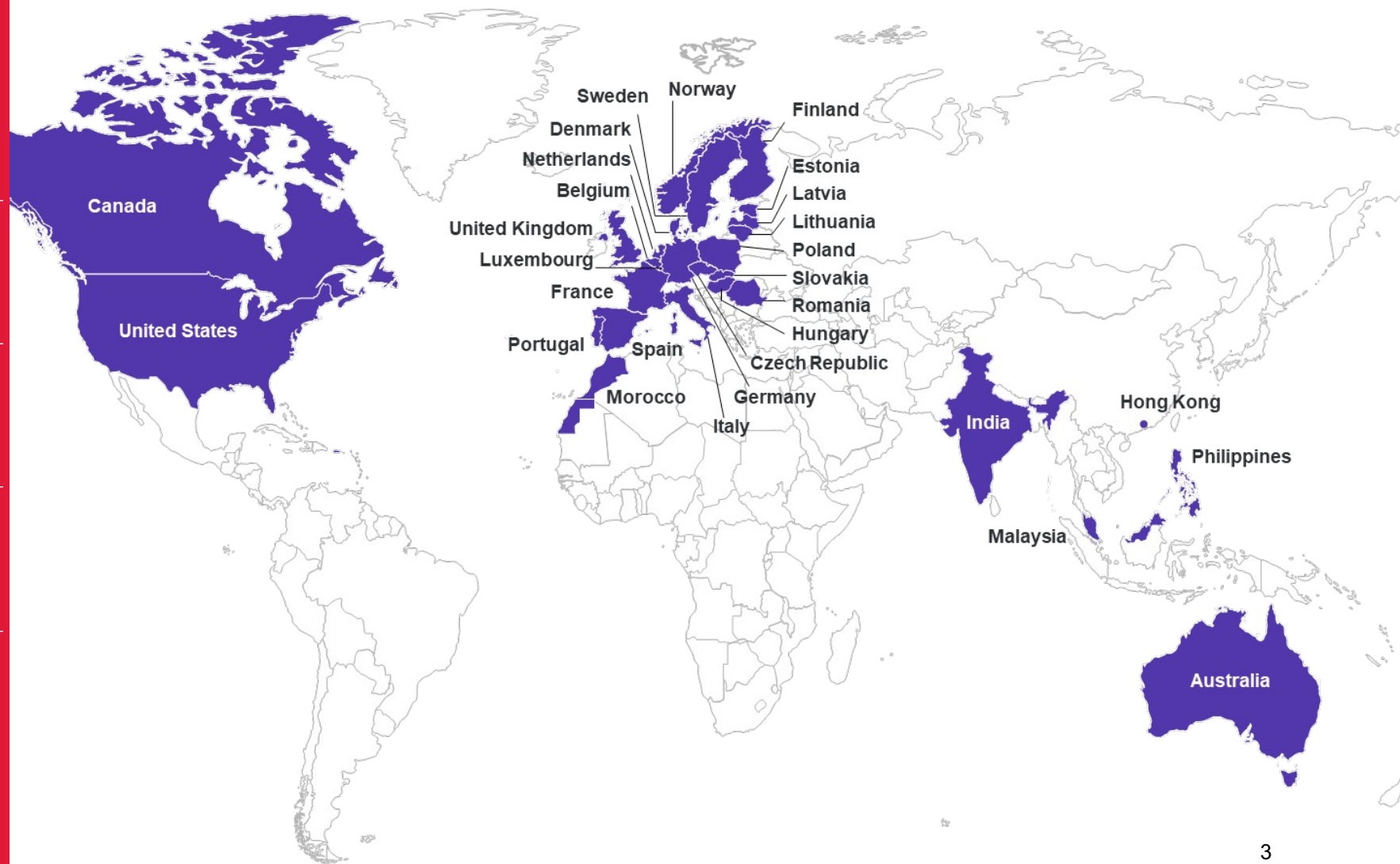
Grundades 1976

Omsättning 12.1 miljarder CAD*

88 500 anställda

400 platser i 40 länder

Helhetspartner till över 5 500 kunder globalt



Agenda

01

Bakgrund

02

Maskininlärning

03

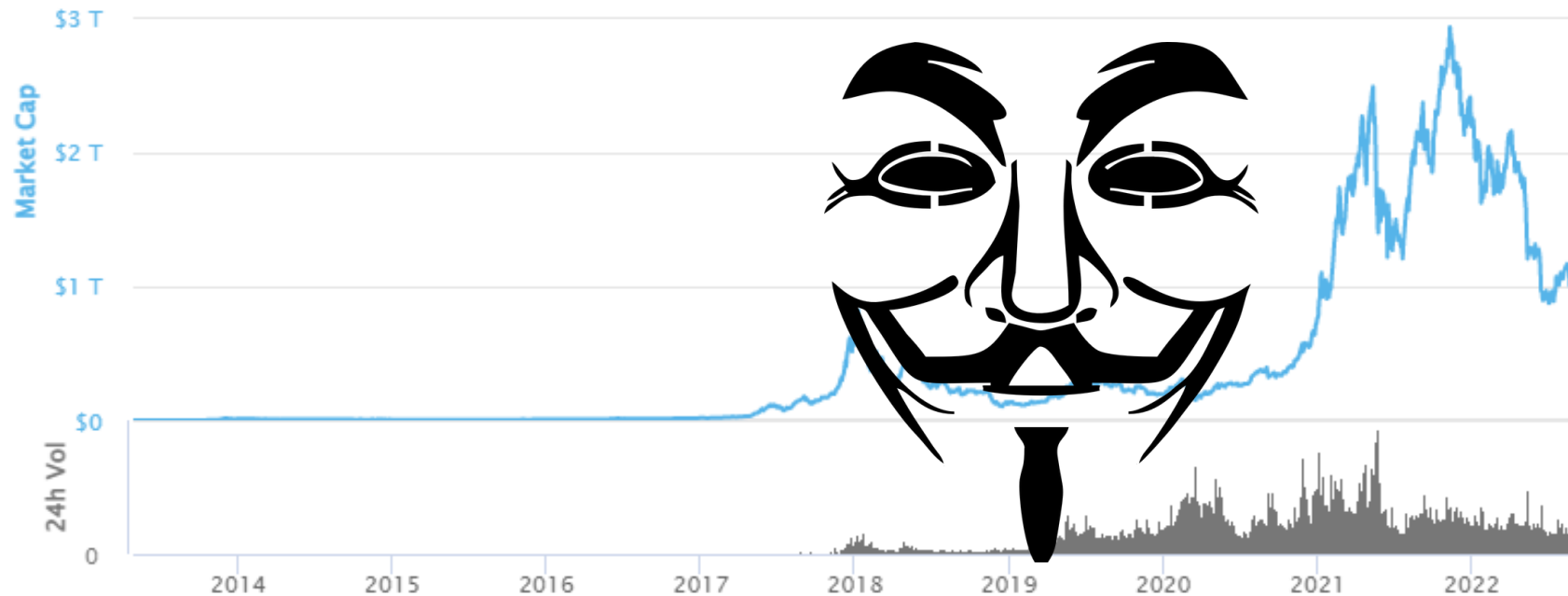
Resultat

04

Sammanfattning

Bakgrund till arbetet

- Marknadstrenderna visar att kryptovalutor blir större
- Penningtvättsbekymmer – anonymitet.



Vad är kryptovalutor?

- Användhet

- D

- B



Home

Prices

Charts

DeFi

NFTs

Academy

Developers

Bitcoin

Ethereum

Bitcoin Cash

BTC Testnet

BCH Testnet

us English

USD

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NMLS Consumer Access

Search Blockchain, Transactions, Addresses and Blocks

0.00%

Solana/USD 33.73 ▼11.77%

Cardano/USD 0.47 ▼4.79%

Polkadot/USD 7.22 ▼4.90%

Polygon/USD 0.86 ▼7.74%

Dogecoin/USD 0.06 ▼4.41%

FTX Token/USD 26.17 ▼8.2%

transactions. This independent network of miners also decreases the chance for fraud or false ir recorded, as the majority of miners need to confirm the authenticity of each block of data before the blockchain, in a process known as "proof of work."

ROI

USD

ETH

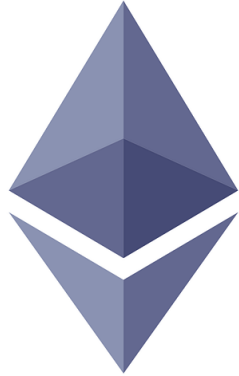
Transactions

6H	0.95%	-1.4%	0.1
1D	0.95%	-1%	0.1
1W	5.59%	6%	22.1
1M	-15.50%	-0.4%	0.1
6M	-51.27%	-11.06%	6:50:40
1Y	-56.79%	-7.94%	2dcf0-a93ac 6:50:39 0.1
3Y	97.47%	-76.83%	a2340-f9c65 6:50:38 0.1
5Y	448.36%	-11.92%	f9f30-65746 6:50:38 0.80505972 BTC \$16,407.00
			8b282-fd248 6:50:36 0.01480852 BTC \$301.80

Converter

Mempool Bitcoin

6 MvB



vigilant of scams interpreting official

07 GMT+2

51 GMT+2

31 GMT+2

44 GMT+2

754,019

14 Sep 2022 • 04:46:29 GMT+2

383 Txs • 1.79 Mb

Average Confirmation Time

Sep 13 - 22.40 Minutes

140

<https://www.blockchain.com/explorer>

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6

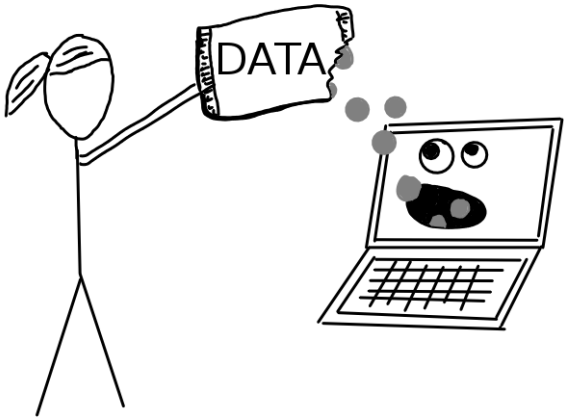
Användning av avancerad dataanalys

- Alla tar del av all information
 - Spårbar
 - Transparent
- Maskininlärning som lösning



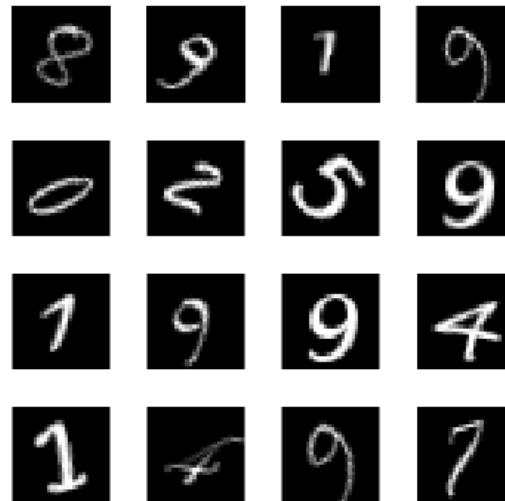
Vad är maskininlärning?

Datainmatning



<https://christophm.github.io/interpretable-ml-book/index.html>

Träningsdata



Algoritmen hittar mönster



Valideringsdata

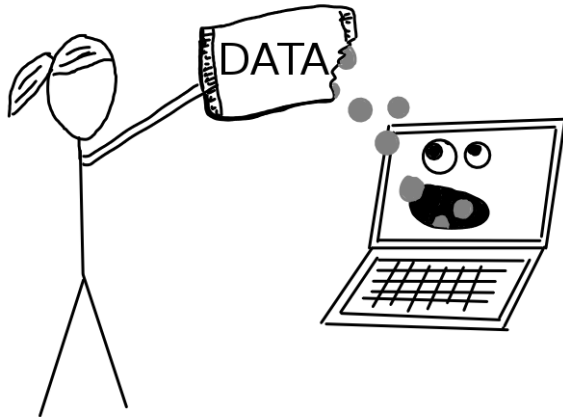


**Om algoritmen klassificerar båda nior
som nior så är algoritmen 100% träffsäker**

Användning av maskininlärning för att stävja penningtvätt

Datainmatning

50 000 transaktioner



<https://christophm.github.io/interpretable-ml-book/index.html>

Träningsdata

45 000 transaktioner

Transaktion 1	Transaktion 5
  	  
Transaktion 2	Transaktion 6
  	  
Transaktion 3	Transaktion 7
  	  
Transaktion 4	Transaktion 8
  	  

Algoritmen hittar mönster

Lagliga



Olagliga



Valideringsdata

5 000 transaktioner

Transaktion 9



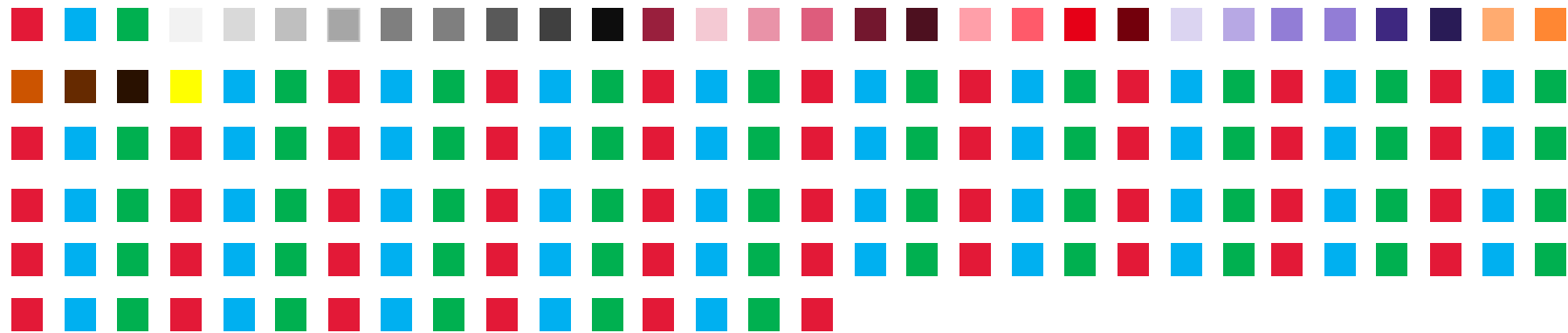
Transaktion 10



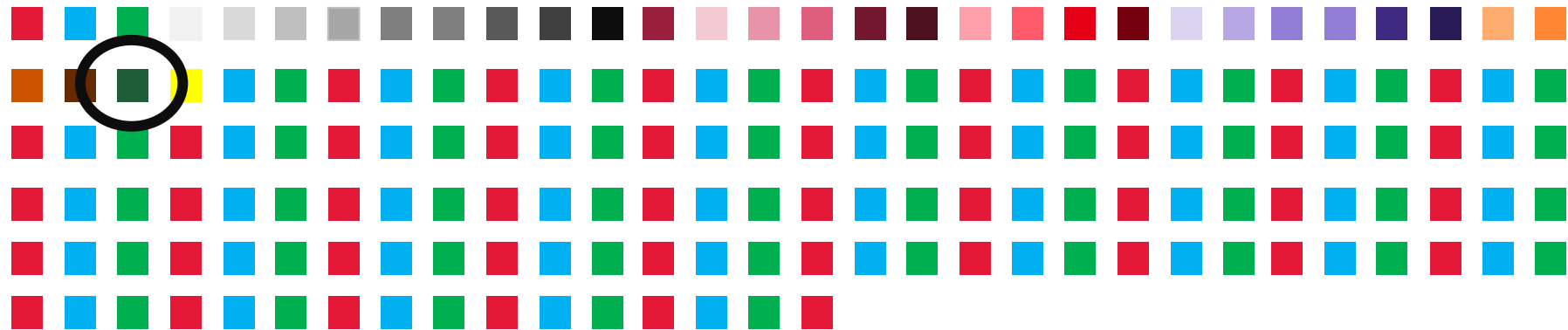
Om algoritmen klassificerar Transaktion 9 som laglig och Transaktion 10 som olaglig är algoritmen 100% träffsäker

Användning av maskininlärning för att stävja penningtvätt

Transaktion 11

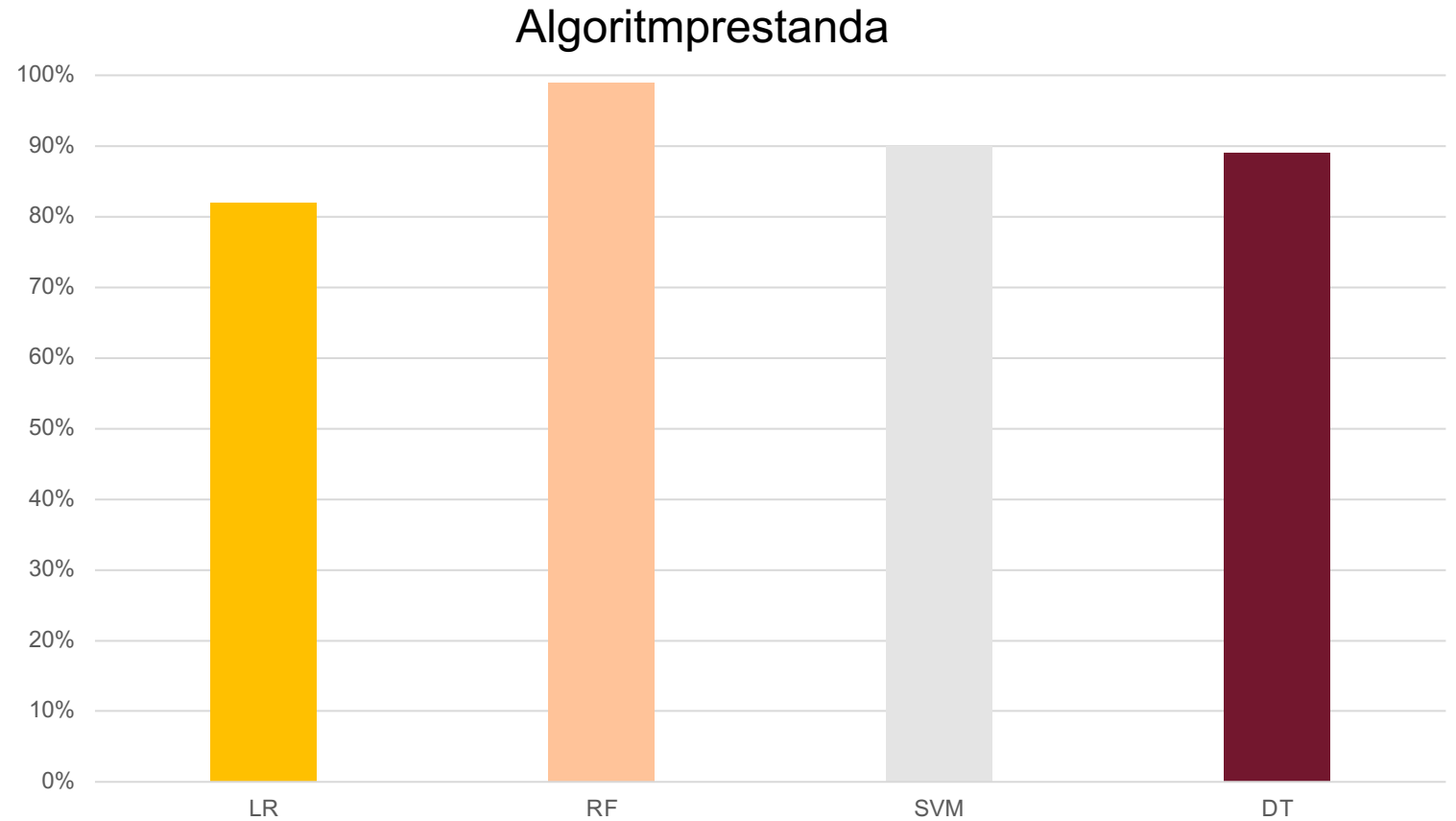


Transaktion 12

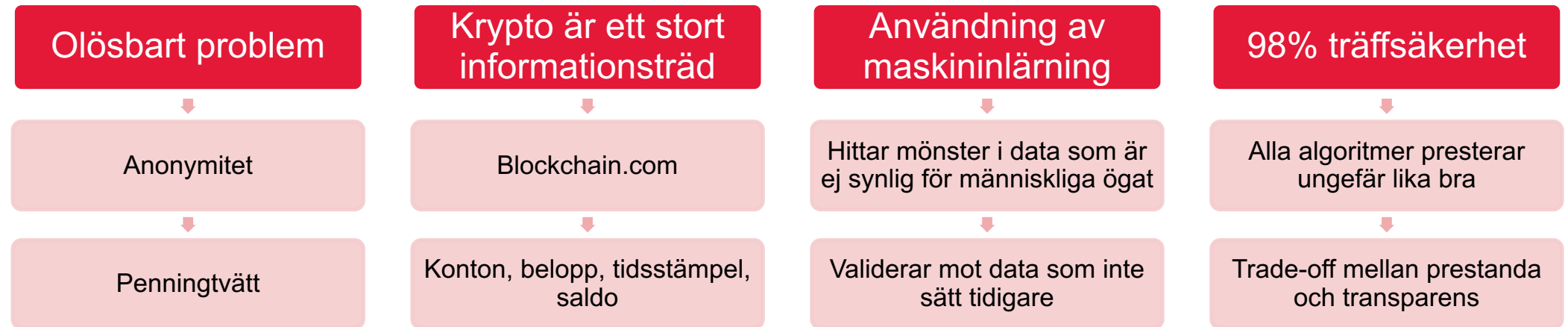


Algoritmanvändning

- Logistic Regression – Vit låda
- Random Forest – Svart låda
- Support Vector Machine – Svart låda
- Decision Tree – vit låda



Sammanfattning



Insights you can act on

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