



Intelligence Artificielle appliquée au monde financier et bancaire

Conference du 11 Mai 2010



Artificial Intelligence

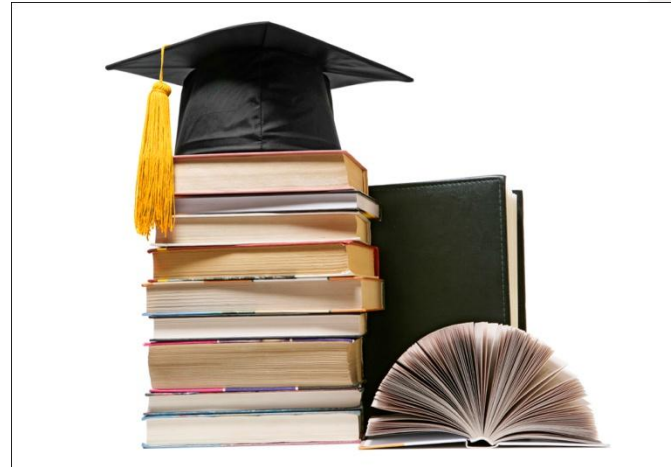
- ✓ The branch of computer science concerned with making computers behave like humans.

programming : computers to play games

expert systems : programming computers to make decisions in real-life situations (Help doctors diagnose diseases based on symptoms)

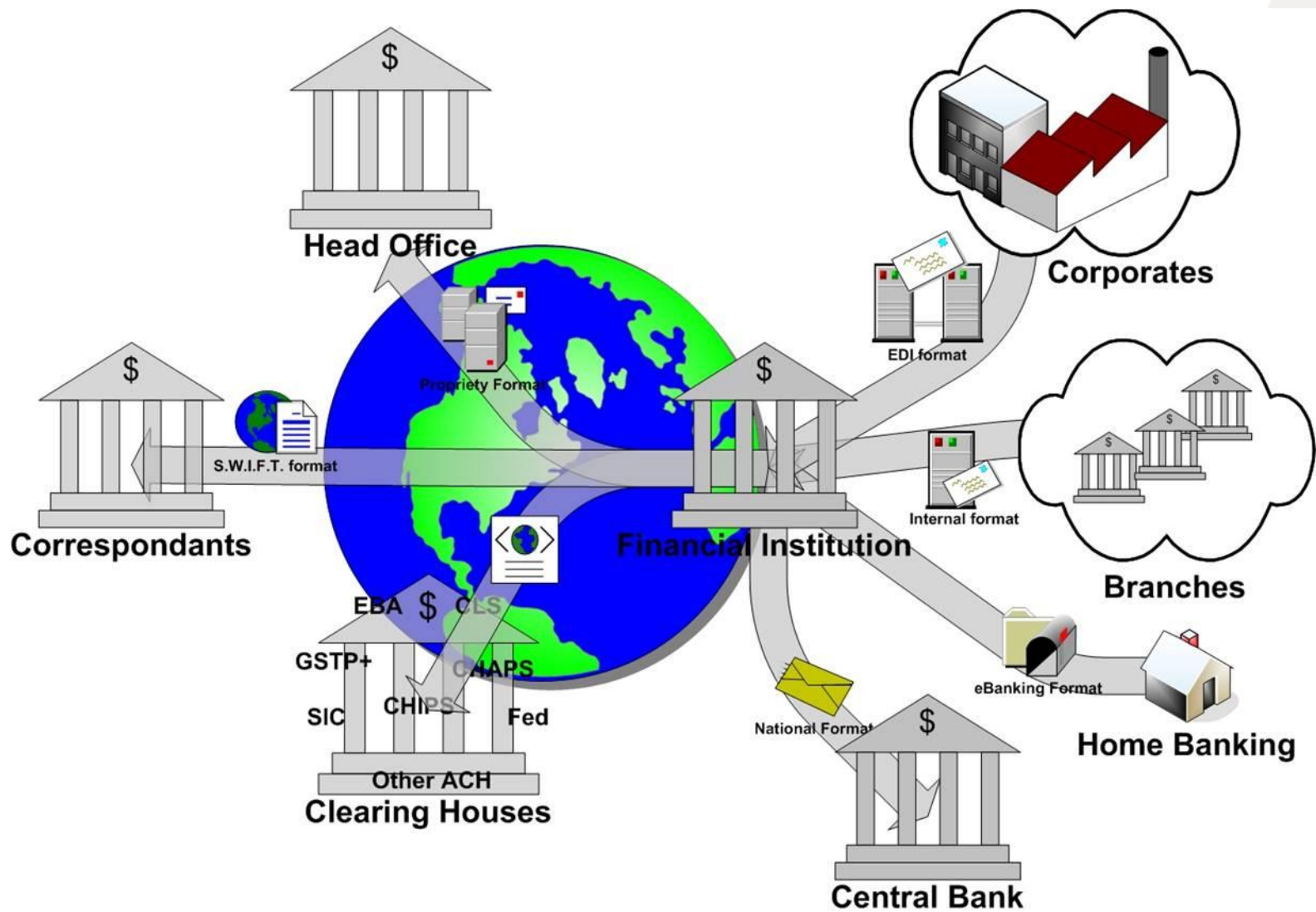
natural language : programming computers to understand natural human language

"Academic"solutions



Rencontre monde universitaire / monde industriel de la finance





Natural Language Processing: Develop the Knowledge

✓ Bindings

- Using basic lexicons to build phrases
- The ultimate step from free-text to “understanding”

✓ Example : “Please, advise the beneficiary by phone”

```
(teleben (:bind :teleben
  (:seq (:opt please-p)
    (:alt (:seq (token :advise)
      ben
      (:opt (:alt (:seq (token :by-prep)
        (:alt (token :swift)
          (token :phone))))
        (token :urgent))))
    (:seq (:alt (token :phone)
      telex-p)
      (token :advise)
      ben))))))
```

Natural Language Processing: Overview

✓ Lexical Analysis

- Challenges
 - > Accuracy: error is not an option for banks
 - > Performances
 - > Constraints: software, hardware
- Indexation
- From free text to semantic: tokenization
 - > Dictionary, Synonyms, Properties, Property values
- From tokens to phrases
 - > Bindings

✓ Magic ?

Natural Language Processing: Giving Knowledge to the Machine

✓ Lexicons and Properties

((:DEFAULT :BANK)

((("BANQUE BEYROUTH POUR LE COMMERCE" "BANQUE BYBLOS"
"BYBLOS BANK S.A.L. (IBU)" "BYBLOS BANK SYRIA SA"
"SECURITY BANK OF LEBANON SAL")))

((("B B L" "BANK BRUESSEL LAMBERT" "BANK KAPITAL" "BANK SLASKI S.A."
"BANQUE BRUXELLES LAMBERT" "BANQUE LOUIS DREYFUS" "BBL" "I.N.G." "ING"))

✓ Generic dictionary, Semantic concepts,

((("INTERNATIONAL") :INTERNATIONAL)

((("THANKS" "DANKE" "DANKE SCHON" "DANKE SCHOEN" "DANKE SEHR") :THANKS)

(:SYNONYM "INTERNATIONAL" "INTERNATIONALE" "INTERNATION" "INTERNAT" "INTERN"
"INT" "INTL" "INTLE" "INTERNACIONAL" "INTERNAC" "INCL" "INTERNAZIONALE")

((("IN FAVOUR OF" "FAVOUR OF" "FAVOURING" "FAVOUR" "FAV" "FOR ACCOUNT OF" "ACCOUNT OF"
"BY ORDER OF" "ORDER OF") :PAYMENT-PHRASE)

Natural Language Processing: When Free-Text becomes structured

✓ Sample

Send by: barclays bank, durham

To: Banque Nationale de Paris, Paris

We instruct you to pay \$123465.78 to Mr John-Marc Noury on his account 123456 at BNP, Rennes. payment originated by Andrew Chrichton, 12 downing street London (Acc. Ref. 78-45-123456). We propose to share fees. Also please advise beneficiary by phone on receipt. Best Regards,

```
{1:F01BNPAFRPPXXX0191062656}{2:O1030002100122BARCGBC1E3275721136941001220002N}{4:
:20:00345127
:23E:TELB
:32A:100511USD123456,78
:50K:/GB27BARC07845123456
ANDREW CHRICHTON
12, DOWNING STREET LONDON
:57A:BNPAFRPPREN
:59:/FR21030024512000123456
JEAN MARC NOURY
:71A:SHA
-}
```

Post 9/11 regulations regarding AML and ATF are increasingly stringent



3rd Directive



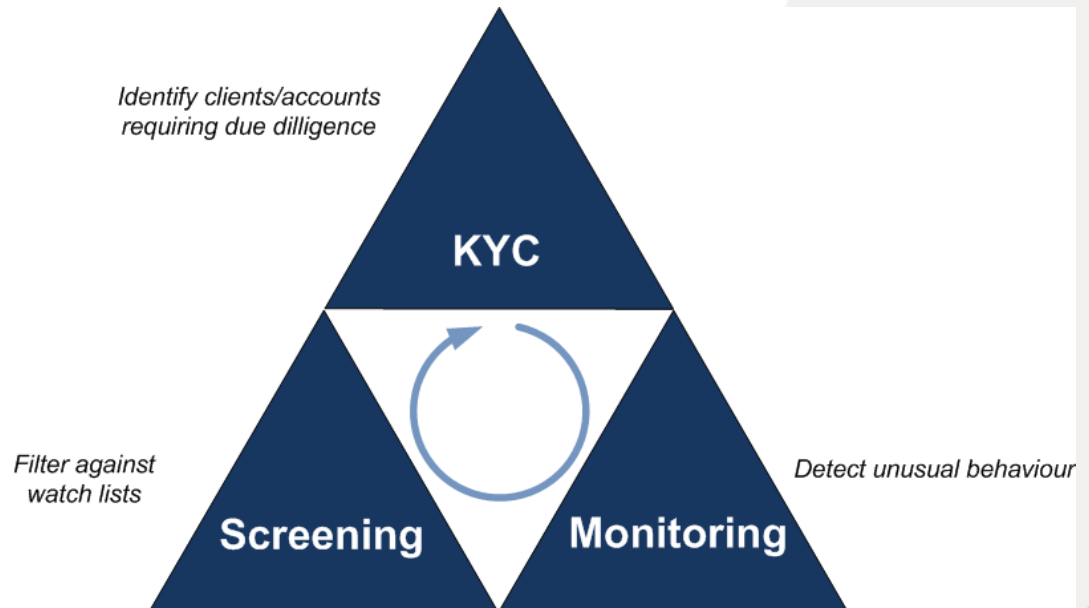
UNITED NATIONS
Office on Drugs and Crime



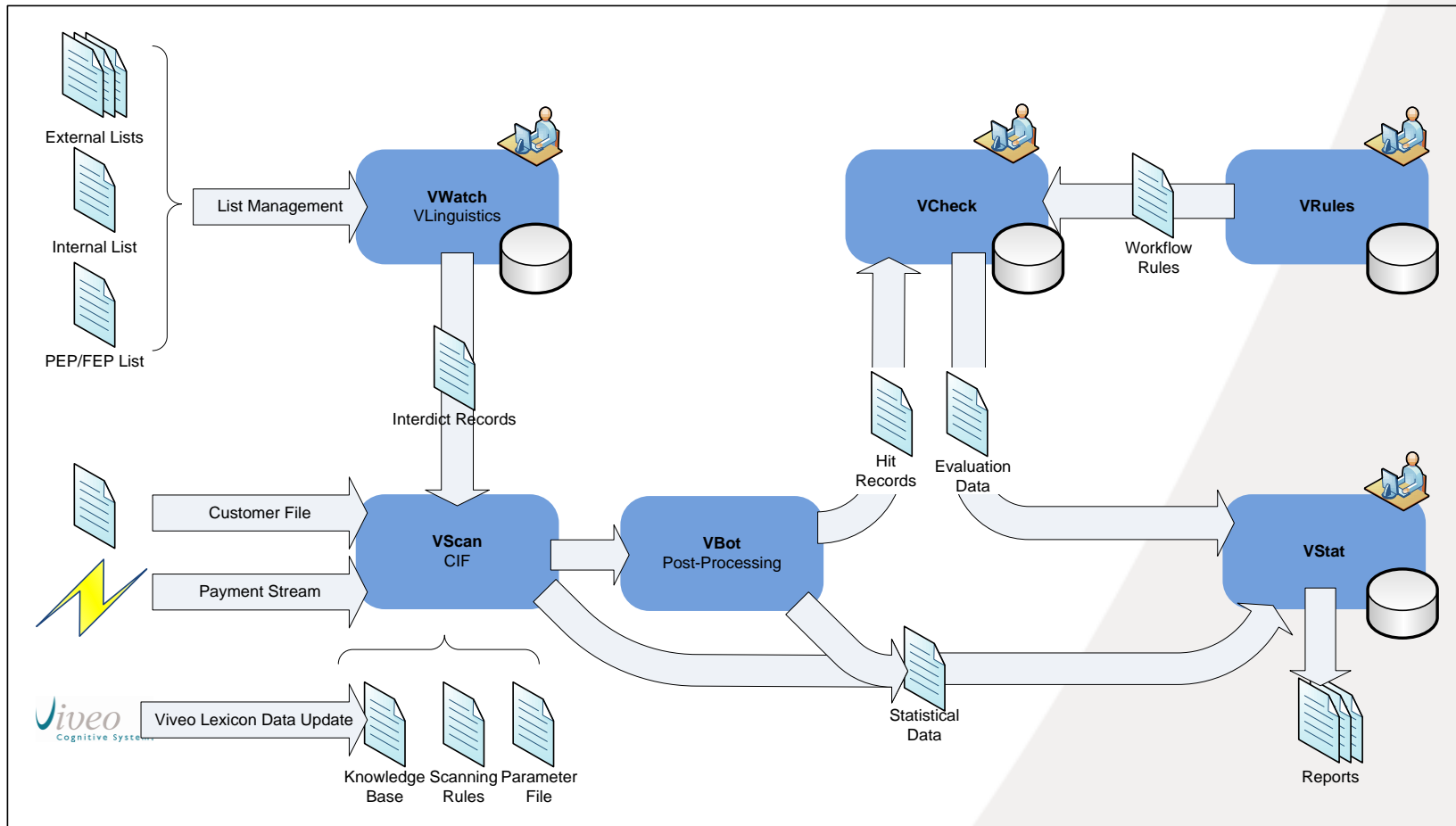
49 Recommendations



USA Patriot Act



Solution Concept



VWatch

VWatch_v1_2 - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://localhost:8080/VWatch/app

VWatch

VRisk → VWatch : List Manager

User Id: FGREEN

[My Profile](#) | [Help](#)

[Lists](#) | [Skip Validation](#) | [Import/Export](#) | [Search](#)

Watch List Management

Watch Lists

- Public Lists
 - [BOE \(150\)](#)
 - [EU \(321\)](#)
 - [OFAC \(416\)](#)**
 - [UN \(325\)](#)
 - [UST1 \(56\)](#)
 - [UST2 \(0\)](#)
 - [WORLDBANK \(520\)](#)
- Global Lists
 - [Trades Global \(227\)](#)
 - [Wealth Global \(256\)](#)
- Private Lists
 - [Monaco-010 EMEA \(321\)](#)
 - [Singapore Trades-015 APAC \(150\)](#)

[OFAC](#) (416 Interdict Entries)

Warning: no scanning rules defined for the list [\[more...\]](#)

Entry:

Displaying entries 1 to 10 [First](#) | [Previous](#) | [1](#) | [2](#) | [3](#) | [Next](#) | [Last](#)

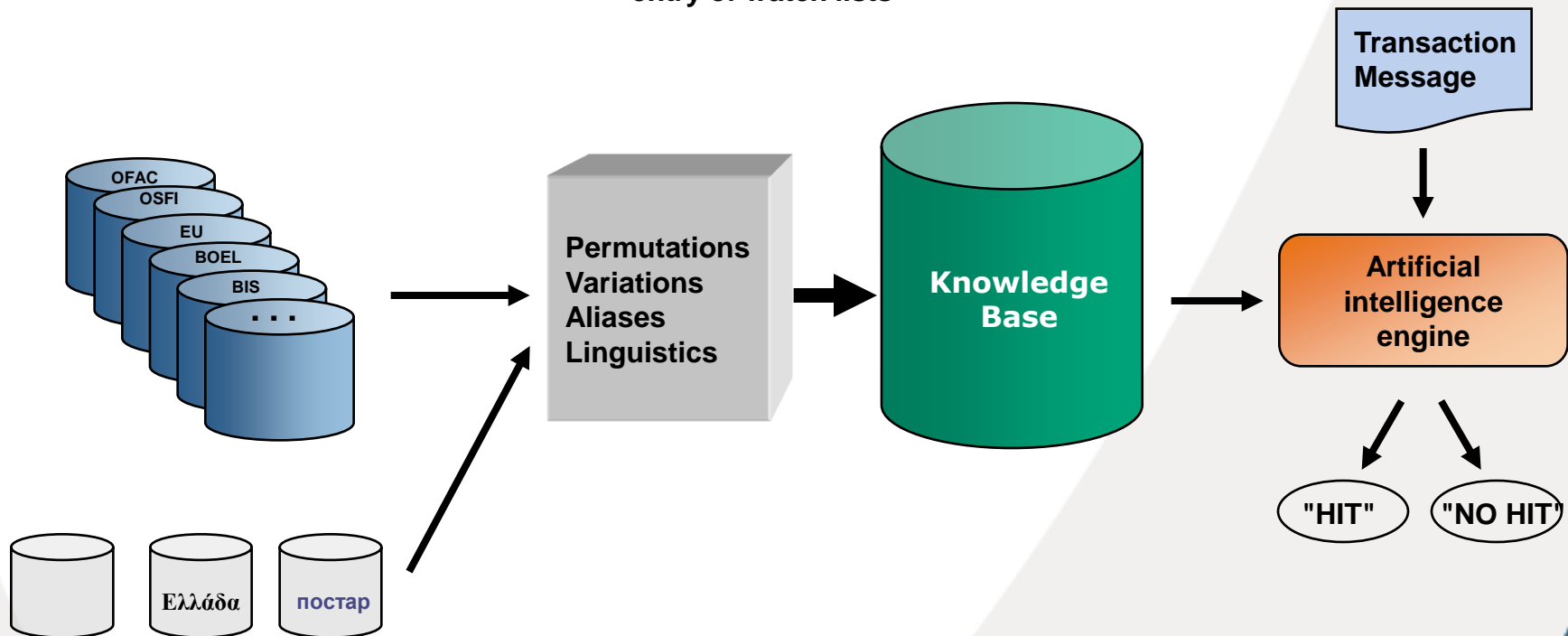
Entry	Type	Original Id	Action
BANK OF SUDAN	Bank	OFAC10010	<input type="button" value="Remove"/>
BANK TAAVON KESHAVARZI IRAN	Bank	OFAC10564	<input type="button" value="Remove"/>
BARRIOS SENIOR, Jario Ascanio	Individual	OFAC14560	<input type="button" value="Remove"/>
BAY INDUSTRIES INC	Bank	OFAC10015	<input type="button" value="Remove"/>
BASAYEV, Shamil Salmanovich	Individual	OFAC15655	<input type="button" value="Remove"/>
BECERRA BECERRA, Alvaro	Individual	OFAC45665	<input type="button" value="Recover"/>
BIN LADEN, Osama Muhammad Awad	Bank	OFAC987987	<input type="button" value="Remove"/>
BONOMERCAD S A	Individual	OFAC123456	<input type="button" value="Remove"/>
BOROVNICA, Goran	Individual	OFAC777444	<input type="button" value="Remove"/>
BOUT, Viktor Anatolijevitch	Individual	OFAC45686	<input type="button" value="Remove"/>

Copyright © 2008 Viveo Cognitive Systems

Done

Overview of the transaction screening module

- 1 Public or private watch lists, politically exposed persons lists, bank specific private lists
- 2 Preprocessing : generation of a set of additional strings to take account variability in name writing for each entry of watch lists
- 3 Test of a database entry or a message

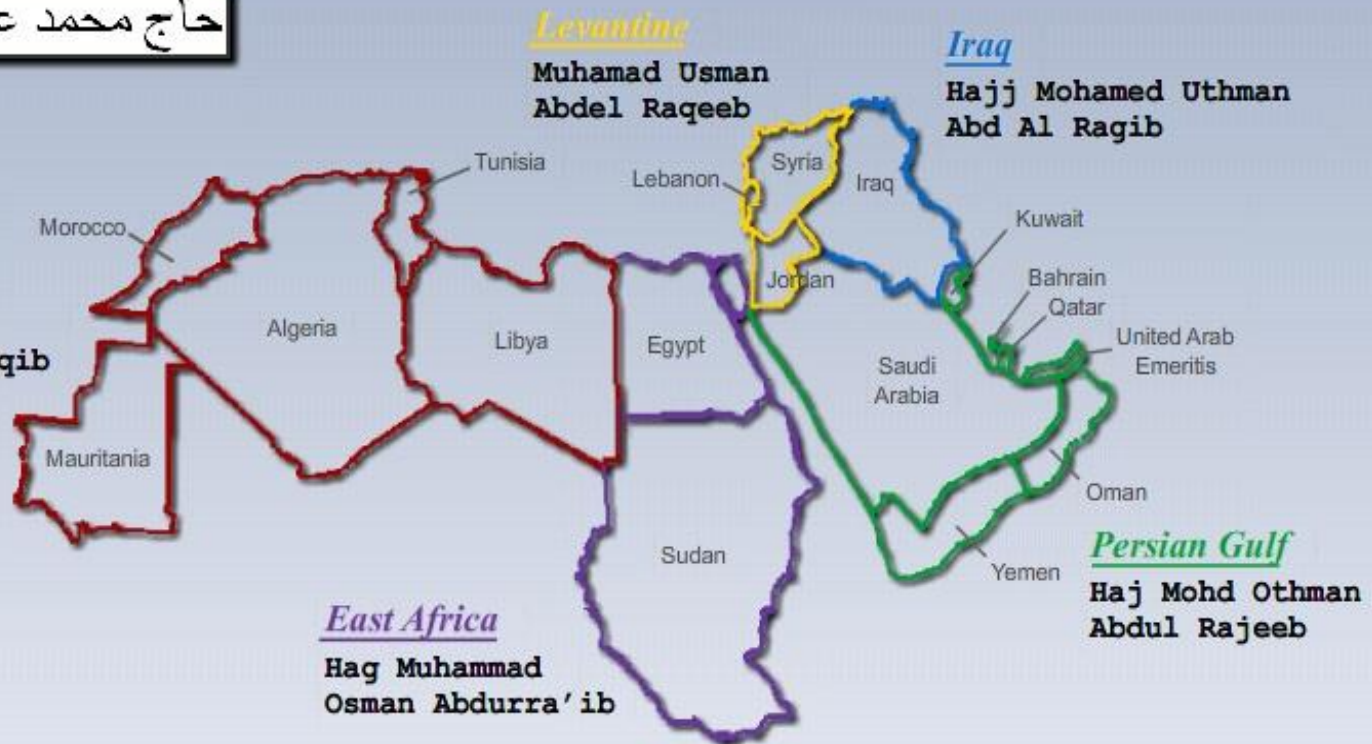


Example 3: The Same Name across the Arabic World

حاج محمد عثمان عبد الرقيب

West Africa

Haj Imhemed
Otmene Abderaib



The Same Name Across the Arabic World

Example 1: The Same Name across SE Asia



張丘蘇

China Passport	Zhang Qiusu
Taiwan Passport	Chang Ch'iu-Su
Thailand Passport	Chiusu Sae Chang
Singapore Passport	Cheung Yau So
Malaysia Passport	Cheung Yau So

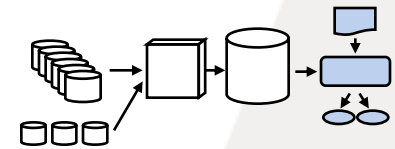
The Same Name across SE Asia

Scanning

✓ Depending on the required depth of analysis, 4 levels of scanning are available :

- Literal analysis – default configuration
 - > Basic string matching with names from the KB : case insensitive and independent of separating spaces
 - > Permutations taken into account
 - > Aliases
- Lexical Analysis
 - > Context analysis
- Relaxed Pattern Matching (RPM) :
 - > The entry string 'looks like' one of the KB entries
 - > Fully customisable approximation level
- Character Based Literal Scanning (CBLS) :
 - > Enhanced recognition on attached words and compressed strings

In case of a payment message as input, the AI engine uses context information



✓ Countries identification

- Variations, permutations of countries names (Iraq, Irak, Irac, etc...)
- ISO country codes (IQ, etc...)
- City / country associations (Baghdad, Bagdad, etc... => Irak)

✓ Financial institutions identification

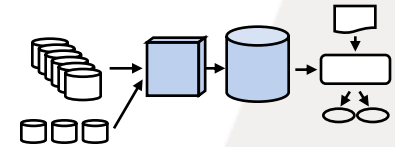
- Free text bank descriptions
 - > Bank Tejarat, Tejarat Bk, Tejarat Bank Ltd, etc.
- Financial IDs (BIC-Codes / Clearing House Codes) related to corresponding watch lists entries



✓ Possibility to elaborate complex business rules (option):

- Homonyms discrimination with contextual data
- Embargo situations
- Halt of business situations
- Hit allocation to operators according to contextual criteria

'Relaxed Pattern Matching' option



- ✓ **Additional pattern matching techniques providing a way of identifying clients or counterparts figuring into a chosen list**
 - Takes into account that string are not equal but "looks alike"
- ✓ **Fully customizable approximation level**

Entrée	Knowledge base	Quality
USAMA BIN LADEN	USAMA BIN LADEN	100%
OSAMA BIN LADEN	USAMA BIN LADEN	93%
USSAMA BIN LADIN	USAMA BIN LADEN	93%
USAMA BEN LADIN	USAMA BIN LADEN	80%
KSAMA BEN LADIN	USAMA BIN LADEN	76%

VCheck



User Id: benrabah
[Home](#) [Module Home](#) [My Profile](#) [Settings](#) [Help](#)

Message Evaluation

[Back to List](#)

Message Header

Message ID	41190	Mandator	001	Sender	INGBNL2AXXX
State	INPUT	Priority	REALTIME	Sender Country	NL
ICG Reference	000000000000000005-19-2009--12:28:13--6	Gateway	SWIFT	Receiver	BARCGB22XXX
Transaction Number	Z530352YN0317977	Amount	12.34	Receiver Country	GB
Message Type	710	Currency	GBP	Timestamp	2009-05-27T16:11+02:00
Active User	benrabah	Flushable	Yes	Value Date	20030311
Application Id	ABC	Direction	I		

Payload

```
{1:F01BARCGB22AXXX6528638270}{2:01031643030527BARCIE2DAXXX40855075870305272343N}{4:
:20:BUG681-skip message
:23B:CRED
:32A:080827USD1475300,00
:33B:USD1475300,00
:50K:IAC SEARCH AND MEDIA
EUROPE LIMITED
FAO MICHELLE DUNNE
UNIT 5
:52D:/75233688
/75233688
:57D:/75233688
:59:/75233688
IAC SEARCH AND MEDIA
:70:TRADE SETTLEMENT - VAL DATE 27/08
:71A:OUR
-}
```

Alert Evaluation

[Close](#)

Alert Navigation

Sort					
Total	2	2	0	0	0

[First](#) | [Previous](#) | [1](#) | [Next](#) | [Last](#)

	IAC
	IAC

IAC

Pattern	Method	Evaluation	Evaluation Comment
IAC		<div>Unknown</div>	<div>Choose One</div>
<div></div>			
<div><div>+</div> Skip Proposal</div>			
<div><div>+</div> Rules</div>			

Message Evaluation

Reason code	<div>Choose One</div>
Comment	<div></div>

Types of False Positives and SKIPs

✓ Various situations can trigger a false positive in a given message :

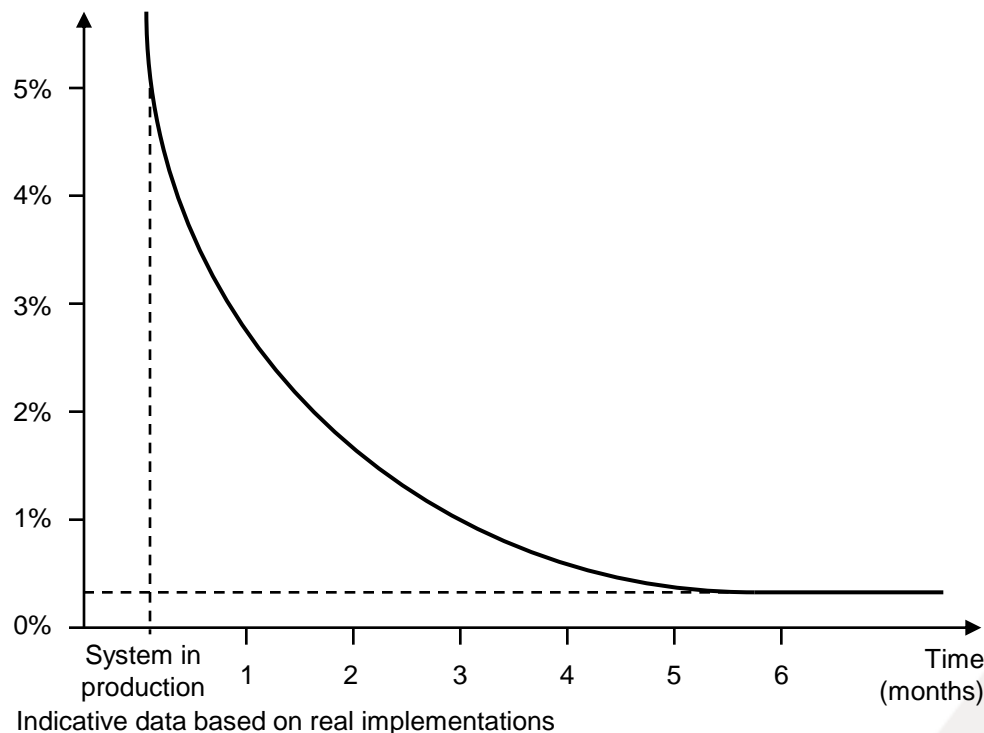
- Homonyms, misspelling, commonly used names (individuals, cities etc), detection through RPM or CBLS, abbreviations, acronyms, short entries etc.

✓ What is a skip :

- A skip is a set of keywords associated with a hit pattern, which when detected together, cancel hit detection
 - > Robert Mugabe is in the OFAC watchlist
 - > One of the Bank's usual counterparts is called Robert Mugab and lives in Flower Street London

Decreasing False Positive Rates

✓ **System tuning significantly lowers the workload associated with processing HITs :**

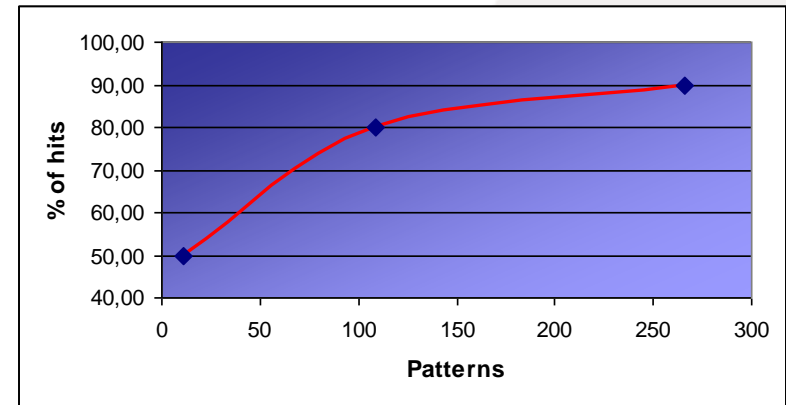


- Addition by users of "skip" key words to prevent alerts on known customers
- Over time, the system becomes more and more efficient
- Significant decrease of the number of Hits, hence of the associated workload
- Nominal "false positive" rate = 0.3%
- Prerequisite : need for well trained users

Patterns in False Positives

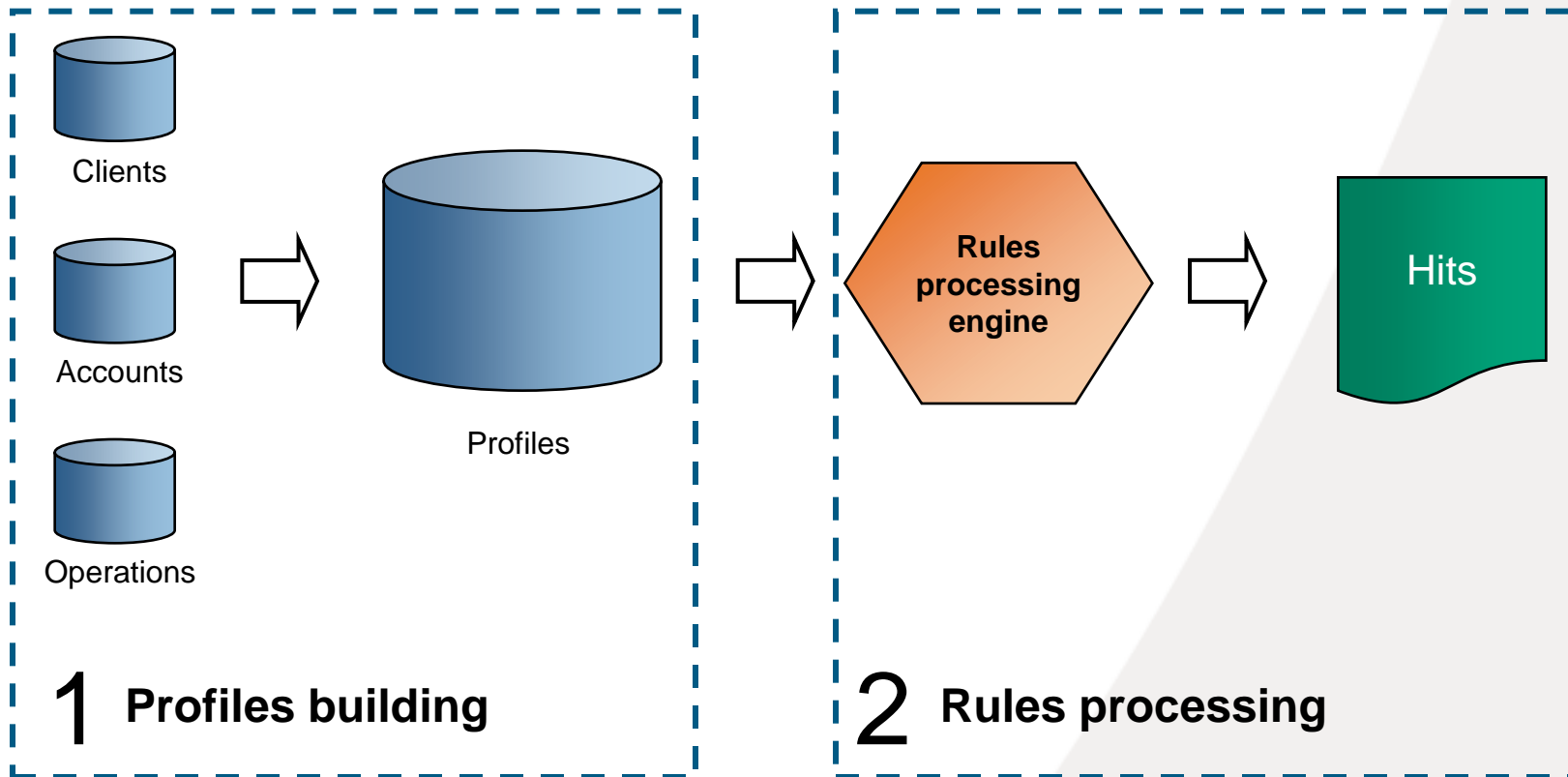
- ✓ Within each institution, false positive hits are triggered by a small set of patterns.
- ✓ Based on an analysis performed using example MT103 traffic we can see that :

- ✓ **50% of all the hits are due to 11 patterns**
- ✓ **80% of all the hits are due to 109 patterns**
- ✓ **90% of all the hits are due to 266 patterns**

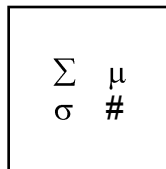
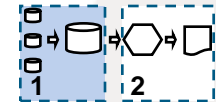


- ✓ A limited number of well chosen patterns have immediate measurable benefits
- ✓ The skip mechanism gets rid of spurious hits, quickly and efficiently
- ✓ Implementation process includes analysing false positives and defining skips

AML Suite behavioral analysis module processes data in 2 major steps

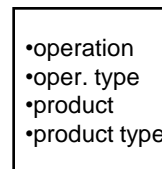


A profile element is built of 3 components (1/2)



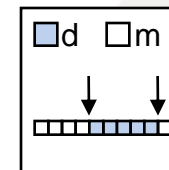
Statistics

+



Scope

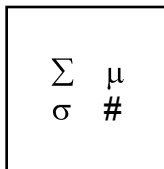
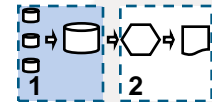
+



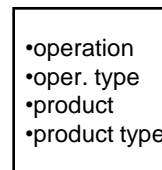
Time span

The **sum of the amounts** of the **cash operations** from **the last 5 days**

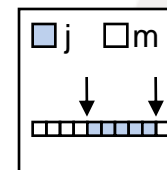
A profile element is built of 3 components (2/2)



Statistics



Scope



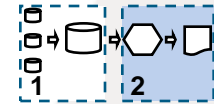
Time span

- ✓ Operations count
- ✓ Sum of amounts
- ✓ Account amount
- ✓ Average amounts
- ✓ Maximum amount
- ✓ Sum of commissions

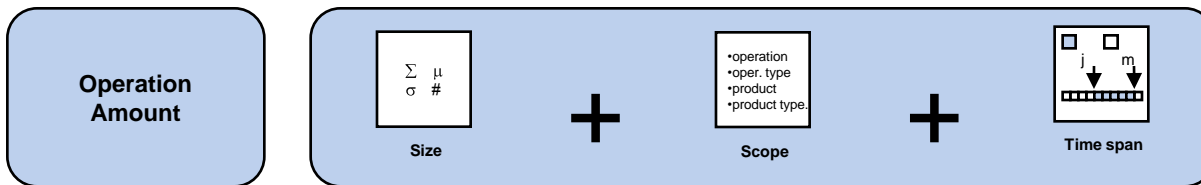
- ✓ Operations of a given type (e.g. cash deposit)
- ✓ Group of operations (e.g. all operations in cash)
- ✓ Products of a given type (e.g. mortgage credit)
- ✓ Group of products (e.g. all products)

- ✓ One or several rolling days
- ✓ One or several rolling months

The rule processing engine compares the elements of clients or accounts profiles



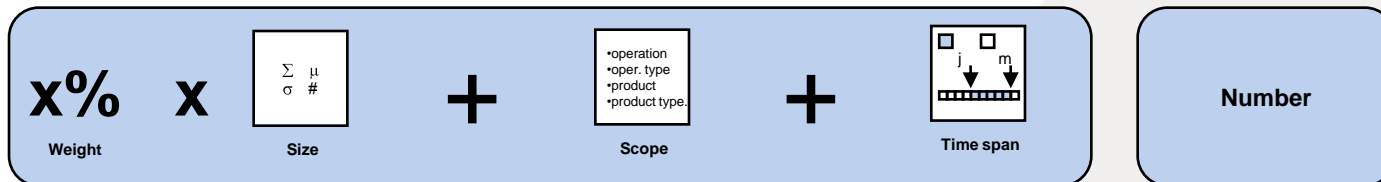
Either a profile element
Or the amount of
an individual
operation



compared to



a weighted
profile element
or a fixed
number



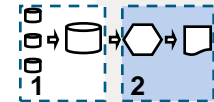
example

The sum of the
amounts of the cash
operations from the
last 5 days

>

5x The sum of the
amounts of the cash
operations from the
last 60 days

The rule processing engine brings the flexibility to adapt to more complex cases



- ✓ **Thresholds are extended to any element of a profile**
 - *hit if amount of operation > \$150k : **threshold***
 - *hit if amount of operation > 10x average value of account : **profile element***
- ✓ **Operations can be pooled into groups**
 - *hit if cash deposit > \$5k : **single operation***
 - *hit if total of cash deposits over a week > 5k : **group of operations***
- ✓ **The frequency of operations can be used as a criterion**
 - *hit if the number of money transfers of the current month > **5x the number of money transfers of last months***