Process Mining: Data Science in Action

Introducing ProM and Disco

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www.processmining.org

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Where innovation starts

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Process Mining Tools

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ProM: 600+ plug-ins

dozens of model types

XES, MXML, CSV files

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Disco: Simple, fast, and easy

fuzzy models

XES, MXML, CSV files

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If you did not install Disco and ProM yet, please do now.

See the written instructions for installation details.

ProM

www.processmining.org
www.promtools.org/prom6/

Run package manager to decide what packages/ plug-ins to use …

ProM UITopia
ProM 6
designed by fluxicon
Workspace
import...
All
Favorites
Imported
Selection
sort by
ABC
Open
Look In:
Gartner-workshop
amc.csv
amc.xes
GartnerWorks
reviewing_co
reviewing_wi
reviewing_wi
Vestia.csv
Select an import plugin...
Available Import Plugins:
ProM log files (Lightweight)
OK
Cancel
File Name:
reviewing_completes_only.xes
Files of Type:
All Files
Open
Cancel
gs,
etc.

ProM UITopia
ProM 6
Workspace
import...
sort by
All
viewer on event log (multiple options and configurable)
remove event log
log
loa
ug-
in to event log
rrors_and_more...

ProM UITopia
ProM 6
designed by fluxicon
reviewing_with_fewer_errors_and_
Create new...
Create new...
Inductive visual Miner
Inductive visual Miner animation test
Log Visualizer
Log Visualizer (context-aware)
Pattern Abstractions (New)
Show Sequences and Patterns
Synchronous activity analysis
Dashboard
Inspector
Summary
Key data
Processes 1
Cases 100
Events 2278
Event classes 14
Event types 1
Originators 11
Min 7
Mean
Event classes per case
Min 7
Mean 10
Max 10
Log info
Start date
Wed Jan 04 00:00:00 CET 2006
End date
Sun Jul 18 01:00:00 CEST 2010
"Log visualizer" as an example viewer
select other viewers

ProM UITopia

ProM 6

reviewing_with_fewer_errors_and_more_data.zip

Create new...

Dashboard

Inspector

Summary

Key data

Processes 1

Cases 100

Events per case

ProM UITopia

ProM 6

reviewing_with_fewer_errors_and_more_data.zip

Dashboard

Log inspector

Browser

Explorer

Log Attributes

1

16 events

Process instances are arranged vertically, shown as streams of triangular events. The color of events describes their fr

ProM UITopia

ProM 6

reviewing_with_fewer_errors_and_more_data.zip

Create new...

designed by fluxicon

Dashboard

Inspector

Summary

Log Summary

save HTML...

Log Summary

Total number of process instances: **100**
Total number of events: **2278**

MXML Legacy Classifier

Event classes defined by MXML Legacy Classifier

All events

Total number of classes: **14**

Class	Occurrences (absolute)	Occurrences (relative)
decide+complete	626	27.48%
invite additional reviewer+complete	526	23.09%
get review X+complete	263	11.545%
time-out X+complete	263	11.545%
collect reviews+complete	100	4.39%
invite reviewers+complete	100	4.39%
time-out 2+complete	55	2.414%
reject+complete	55	2.414%
time-out 1+complete	55	2.414%
time-out 3+complete	50	2.195%
get review 3+complete	50	2.195%
get review 2+complete	45	1.975%
get review 1+complete	45	1.975%
accept+complete	45	1.975%

Start events

Total number of classes: **1**

Class	Occurrences (absolute)	Occurrences (relative)

50
51
52

Selecting another visualizer: Xdotted Chart (comparable to the Dotted Chart plug-in)

ProM UITopia
ProM 6
designed by fluxicon
reviewing_with_fewer_errors_and_more_data.zip
Create new...
Dotted Chart
Legend
Information
Wed Jan 04 00:00:00 CET 2006
Wed Jun 14 02:00:00 CEST 2006
Wed Nov 29 17:00:00 CET 2006
Thu May 10 17:00:00 CEST 2007
Tue Oct 23 12:00:00 CEST 2007
Fri Apr 04 09:00:00 CEST 2008
Mon Sep 08 13:00:00 CEST 2008
Tue Feb 24 04:00:00 CET 2009
Sat Aug 01 08:00:00 CEST 2009
Tue Jan 12 04:00:00 CET 2010
time
helicopter view
cases

Component:
Cases
Data type for color:
concept:name
Time:
Actual
Time unit (milliseconds):
3600000
Case order:
Occurrence of first event
Apply settings
Nov 29 17:00:00 CET 2006
Thu May 10 17:00:00 CEST 2007
Tue Oct 23 12:00:00 CEST 2007
Fri Apr 04 09:00:00 CEST 2008
Mon Sep
what is on y-
order based
time
number
...
x-axis always shows time

ProM UITopia
ProM 6
fluxicon
reviewing_with_fewer_errors_and_more_data.zip
Dotted Chart
Legend
Information
0 hours 1009 hours 2458 hours 3907 hours 5356 hours 6784 hours 8233 hours 9682 hours
relative time sorted by duration

ProM UITopia
ProM 6
designed by fluxicon
Workspace
import...
All
Favorites
Imported
Selection
sort by
ABC
reviewing_with_fewer_errors_and_more_data.zip
Event Log
reviewing_with_fewer_errors_and_more...
Event Log
just created
imported
Show parents
Show children
Export to disk
let us apply the Alpha algorithm to this event log

ProM UITopia
ProM 6
designed by fluxicon
Actions
Activity...
Input
reviewing_with_fewer_errors_and_more_da...
Event Log
Click to add input object
Actions
Filter:
00JB Comparison Visualization with Tree from String
J.C.A.M.Buijs (j.c.a.m.buijs@tue.nl)
JoosBuijs
Abstract Log for Compliance Checking
D. Fahland (d.fahland@tue.nl)
Compliance
ActiTraC
Jochen De Weerdt (Jochen.DeWeerdt@econ.kuleuven.be)
Add Artificial Events
J. Claes (jan.claes@ugent.be)
Add Missing Events
J. Nakatumba (jnakatum@tue.nl)
Add Noise to Log Filter
R.S. Mans (r.s.mans@tue.nl)
Add Passages Info
H.M.W. Verbeek (h.m.w.verbeek@tue.nl)
Align Log And Model for Repair (find loops)
D. Fahland (d.fahland@tue.nl)
Uma
Align Log And Model for Repair (global costs)
D. Fahland (d.fahland@tue.nl)
Uma
Align Log to Model
D. Fahland (d.fahland@tue.nl)
Uma
Analyze Transition System
M. Pesic (m.pesic@tue.nl)
Animate Event Log in Fuzzy Instance
Reset
Start
Output
Click to add output object
select plug-in

ProM UITopia
ProM 6
designed by fluxicon
Actions
Activity...
Input
reviewing_with_fewer_errors_and_more_da...
Event Log
Actions
Filter:
alpha
Mine for a Petri Net using Alpha-algorithm
B.F. van Dongen (b.f.v.dongen@tue.nl)
AlphaMiner
Reset
Start
Output
Petrinet
Petri net
Marking
Marking
input
output
start
plug-in

discovered workflow net

ProM UITopia
ProM 6
Workspace
import...
sort by
ABC
All
Favorites
Imported
Selection
Petrinet from reviewing_with_fewer_errors_and_more_data.zip , mined with AlphaMiner
Petri net
reviewing_with_fewer_errors_and_more_data.zip
Event Log
Petrinet from reviewing_wi...
Petri net
created less than a minute ago
by Mine for a Petri Net using Alpha-algorithm
many plug-ins can work on such model (from verification to conformance checking)

ProM UITopia

ProM 6

designed by fluxicon

Actions

Activity...

Input

Petrinet from reviewing_with_fewer_errors_...
Petri net

Click to add input object

Actions

Filter:

- Configure Visibility of Transitions
  Arya Adriansyah (a.adriansyah@tue.nl)
  PNetReplayer
- connect log events to Petri nets with omega transitions
  D. Fahland (d.fahland@tue.nl)
  Compliance
- Convert Petri net to BPMN diagram
  A. Kalenkova (akalenkova@hse.ru)
- Create Accepting Petri Net
  H.M.W. Verbeek (h.m.w.verbeek@tue.nl)
- Create Decomposed Replay Problem Parameters
  H.M.W. Verbeek (h.m.w.verbeek@tue.nl)
- Create Final Marking
  Arya Adriansyah (a.adriansyah@tue.nl)
  PNetReplayer
- Create Initial Marking
  Arya Adriansyah (a.adriansyah@tue.nl)
  PNetReplayer
- Create/Edit PetriNet With Data
  M. de Leoni (m.d.leoni@tue.nl)
- Discover of the Process Data-Flow (Decision-Tree Mine
  M. de Leoni (m.d.leoni@tue.nl)
- Enrich Petri Net with performance data (default mapping
  A. Rogge-Solti (andreas.rogge-solti@hpi.uni-potsdam.de)
- Export Alignment to CSV for Decision Point Analysis
  Arya Adriansyah (a.adriansyah@tue.nl)
  PNetAlignmentAnalysis
- Export Alignment to CSV for Deviation Analysis

Reset

Start

Output

Click to add output object

Convert Petri net to BPMN diagram

Analyze structural properties Petri net

e.g., place invariants

ProM UITopia
ProM 6
designed by fluxicon
Actions
Activity...
Input
Petrinet from reviewing_with_fewer_errors_...
Petri net
reviewing_with_fewer_errors_and_more_da...
Event Log
Actions
Filter:
search...
Abstract Log for Compliance Checking
D. Fahland (d.fahland@tue.nl)
Compliance
Align Log And Model for Repair (find loops)
D. Fahland (d.fahland@tue.nl)
Uma
Align Log And Model for Repair
D. Fahland (d.fahland@tue.nl)
Uma
Align Log to Model
D. Fahland (d.fahland@tue.nl)
Uma
Check Compliance Using Conformance Che
Start
Output
both model and event log are selected as input
many replay techniques available: from simplification to conformance checking

ProM UITopia
ProM 6
designed by fluxicon
PomPom View for Petrinet from reviewing_with_fewer_errors_and_more_data.zip , mined with AlphaMiner
Create new...
PIP
Zoom
time-out
2+complete
invite additional
reviewer+complete
reject+compl
accept+com
get review
X+complete
time-out
X+complete
slider to simplify process model based on frequencies in the event log
Node filter
Significance cutoff:
0
Show Result
Export

ProM UITopia

ProM 6

designed by fluxicon

PomPom View for Petrinet from reviewing_with_fewer_errors_and_more_data.zip , mined with AlphaMiner

Create new...

PIP

Zoom

Export

Node filter

Significance cutoff:

33

Show Result

Inductive miner infrequent

ProM UITopia

ProM 6

designed by fluxicon

Process Tree

Create new...

Input

Process Tree
ProcessTree

Actions

Filter:

search...

Apply Context
D.M.M. Schunselaar (D.M.M.Schunselaar@tue.nl)

Combine a number of Process Trees using an activity PT
D.M.M. Schunselaar (D.M.M.Schunselaar@tue.nl)

Convert Process Tree to CPN Model
D.M.M. Schunselaar (D.M.M.Schunselaar@tue.nl)

Convert Process Tree to Petri Net
S.J.J. Leemans (s.j.j.leemans@tue.nl)

Convert Process Tree to Petri Net - keep structure
S.J.J. Leemans (s.j.j.leemans@tue.nl)

Output

Petri net
Petri net

Initial Marking
Marking

Final Marking
Marking

ProM UITopia

ProM 6

designed by fluxicon

Petri net

Create new...

PIP

Zoom

Export

ProM UITopia

ProM 6

designed by fluxicon

Actions

Activity...

Input

reviewing_with_fewer_errors_and_more_da...
Event Log

Actions

Filter: inducti

- Mine Petri net with Inductive Miner-infrequent
  S.J.J. Leemans (s.j.j.leemans@tue.nl)
- Mine Petri net with Inductive Visual Miner
  S.J.J. Leemans (s.j.j.leemans@tue.nl)
- Mine Process Tree with Inductive Miner-infrequent
  S.J.J. Leemans (s.j.j.leemans@tue.nl)
- Mine Process Tree with Inductive Miner-state of art
  S.J.J. Leemans (s.j.j.leemans@tue.nl)
- Mine Process Tree with Inductive Visual Miner
  S.J.J. Leemans (s.j.j.leemans@tue.nl)
- Mine Petri net with Inductive Miner
  S.J.J. Leemans (s.j.j.leemans@tue.nl)
- Mine Petri net with Inductive Miner-exhaustive k-successo
  S.J.J. Leemans (s.j.j.leemans@tue.nl)
- Mine Petri net with Inductive Miner-incompleteness
  S.J.J. Leemans (s.j.j.leemans@tue.nl)
- Mine Process Tree with Inductive Miner
  S.J.J. Leemans (s.j.j.leemans@tue.nl)
- Mine Process Tree with Inductive Miner-exhaustive k-succ
  S.J.J. Leemans (s.j.j.leemans@tue.nl)
- Mine Process Tree with Inductive Miner-incompleteness
  S.J.J. Leemans (s.j.j.leemans@tue.nl)

Reset

Start

Output

Interactive Miner launcher
InteractiveMinerLauncher

Inductive visual miner

ProM UITopia
ProM 6
Interactive Miner launcher
Create new...
activities:
paths:
invite reviewers
100
get review 2
45
time-out 2
55
get review 3
50
time-out 3
50
get review 1
45
time-out 1
55
collect reviews
100
frequencies are shown

seamless simplification

<<add animation 1>>

ProM UITopia

ProM 6

designed by fluxicon

Actions

Activity...

Input

reviewing_with_fewer_errors_and_more_da...
Event Log

Actions

Filter: fuzz

- **Animate Event Log in Fuzzy Instance**
  H. Verbeek (h.m.w.verbeek@tue.nl)
  Fuzzy
- **Mine for a Fuzzy Model**
  H.M.W. Verbeek (h.m.w.verbeek@tue.nl)
  Fuzzy
- **Mine Fuzzy Causal Activity Matrix**
  H.M.W. Verbeek (h.m.w.verbeek@tue.nl)
- **Mine Fuzzy Causal Activity Matrix**
  H.M.W. Verbeek (h.m.w.verbeek@tue.nl)
- **Mine Fuzzy Matrix**
  X. Lu (x.lu@student.tue.nl)

Reset

Start

Output

Fuzzy Model
MetricsRepository

ProM UITopia
ProM 6
Fuzzy Model
Create new...
PIP
Zoom
invite reviewers
complete
0.890
time-out 3
complete
0.070
get review 3
complete
0.168
time-out 1
complete
0.079
get review 1
complete
0.102
time-out 2
complete
0.160
get review 2
complete
0.151
collect reviews
complete
0.227
decide
complete
1.000
accept
complete
0.823
invite additional
reviewer
complete
0.671
reject
complete
0.835
get review X
complete
0.636
time-out X
complete
0.595
Concurrency filter
Edge filter
Node filter
Significance cutoff
0.000
Export
Fuzzy miner
seamless
simplification

ProM UITopia
ProM 6
designed by fluxicon
Actions
Activity...
Input
Fuzzy Instance
MutableFuzzyGraph
reviewing_with_fewer_errors_and_more_da...
Event Log
Actions
Filter:
search...
Animate Event Log in Fuzzy Instance
H. Verbeek (h.m.w.verbeek@tue.nl)
Fuzzy
Get M From Pair
D.M.M. S aar (D.M.M.Schunselaar@tue.nl)
Unpac e Type
M. West tergaard@tue.nl)
Reset
Start
Output
Fuzzy Animation
FuzzyAnimation
replay log on model

ProM UITopia
ProM 6
designed by fluxicon
Fuzzy Animation
Create new...
Activity
100 %
Completion
3 %
case progress
get review 3
complete
time-out 2
complete
time-out 3
complete
collect reviews
complete
time-out 1
complete
decide
complete
reject
complete
invite additional reviewer
complete
accept
complete
get review X
complete
time-out X
complete
not simulated:
real process!
playback speed
zoom view

<<add animation 2>>

Social network miners

Social network based on handover of work

ProM UITopia
ProM 6
designed by fluxicon
Social Network (HoW)
Create new...
Layout
SpringLayout
Ranking
Betweenness
Mouse Mode
TRANSFORMING
Edges removed for cl...
View options
shape by degree
size by ranking
stretch by degree ratio
show vertex names
show edge weight values
show edge
stroke highlight on selection
Group Clusters
Hyperbolic View
Pam
John
Mike
Carol
__INVALID__
Sam
Sara
Pete
social network can be analyzed and inspected

ProM UITopia
ProM 6
designed by fluxicon
Actions
Activity...
Input
Petrinet from reviewing_with_fewer_errors_...
Petri net
reviewing_with_fewer_errors_and_more_da...
Event Log
Click to add input object
Actions
Filter:
replay
Replay a Log on Petri Net for All Optimal Alignments
Arya Adriansyah (a.adriansyah@tue.nl)
PNetReplayer
Replay a Log on Petri Net for Conformance Analysis
Arya Adriansyah (a.adriansyah@tue.nl)
PNetReplayer
Replay a Log on Petri Net for Performance/Conformance An
Arya Adriansyah (a.adriansyah@tue.nl)
PNetReplayer
Replay Passages
Eric Verbeek (h.m.w.verbeek@tue.nl)
Passages
Create Decomposed Replay Problem
H.M.W. Verbeek (h.m.w.verbeek@tue.nl)
Create Decomposed Replay Problem
H.M.W. Verbeek (h.m.w.verbeek@tue.nl)
Create Replay Problem
H.M.W. Verbeek (h.m.w.verbeek@tue.nl)
Replay with Default Parameters
Eric Verbeek (h.m.w.verbeek@tue.nl)
Passages
Show Replay Costs
Reset
Start
Output
Click to add output object
Replay techniques for Petri net and event log

select final marking

Create Event Class Pattern

Create New Pattern/Omega-Pattern | Pattern | Omega-Pattern

Choose Event Classifier: MXML Legacy Classifier

List of Event Class

- accept+complete
- collect reviews+complete
- decide+complete
- get review 1+complete
- get review 2+complete

Add >>

<< Remove

Committed Patterns

- accept(complete)
- collect reviews(complete)
- decide(complete)
- get review 1(complete)
- get review 2(complete)
- get review 3(complete)
- get review X(complete)
- invite additional reviewer(complete)

Remove selected pattern(s)

Cancel

Set Cost for Movements

Maximum explored states (in hundreds). Set max for unlimited. 2000

Transition Class	Move on Model Cost
accept+complete	1
collect reviews+complete	1
decide+complete	1
get review 1+complete	1
get review 2+complete	1
get review 3+complete	1
get review X+complete	1
invite additional reviewer+complete	0
invite reviewers+complete	0

Set all costs above to 1 Set

Event Class	Move on Log Cost
accept+complete	1
collect reviews+complete	1
decide+complete	1
get review 1+complete	1
get review 2+complete	1
get review 3+complete	1
get review X+complete	1
invite additional reviewer+complete	1
invite reviewers+complete	1

Set all costs above to 1 Set

Transition Class	Move Synchronous Cost
accept+complete	0
collect reviews+complete	0
decide+complete	0

Cancel Previous Finish

ProM UITopia
ProM 6
Sequence pattern manifestation in reviewing_with_fewer_errors_and_more_data.zip
Create new...
Inspector
Info
Display
Filter
Export
Color & Size Setting
Transition Color
Sojourn time (avg)
None
Transition Border Width
Transition frequency
Waiting time (avg)
None
Place Border Width
Place frequency
Arc frequency
Arc frequency
clear bottleneck
1
invite reviewers+complete ()
time-out 1+complete (NaN)
get review 1+complete (NaN)
get review 3+complete (NaN)
time-out 3+complete (NaN)
collect reviews+complete (8.48 days)
decide+complete (3.89 months)
invite additional reviewer+complete ()
reject+complete (3.33 days)
accept+complete (3.00 days)
time-out X+complete (NaN)
get review X+complete (NaN)

ProM
process mining workbench
changing ecosystem
600 plug-ins
new functionality every day
extremely powerful but for some confusing …

Disco

www.fluxicon.com

Disco - New project

Academic
w.m.p.v.d.aalst@tue.nl

Disco

Project: New project

New

Export

Time to get started!

Your project is currently empty, so there is nothing to see here yet.
If you want to get to know Disco first, you can play around with our sandbox project.
You can also get started right away by loading your own event log.

Play in the sandbox

Are you new to Disco, or do you want to play around but you don't have any data at hand? Our sandbox project includes everything you need to start experimenting with Disco safely.

Sandbox...

Load your own data

Load your event logs from CSV, XLS, MXML, XES, and FXL files, or import complete projects from DSC archives. You can add event logs at any time by using the leftmost toolbar button on top.

Open file...

Version 1.6.7

one can load csv files and XES files

cas

timest

other data

acti

resource

Disco - New project
Academic
w.m.p.v.d.aalst@tue.nl
Disco
Activity
column is used
Activity
Name: Activity
Case ID
Activity
Resource
Complete Timestamp
AANTALVERRICHTINGEN
AANVSPEC
ABW_CODE
ABW_OMSCHR
AGBCODE
CBV_VERRCODE
CBV_VERROMS
CLUSTERNAAM
DBCSPEC
ac
resource
es
other data
Cancel
File encoding: UTF-8
Use quotes
Ready to start import.
Start import

Disco - New project
amc
Map
Statistics
Cases
Academic
w.m.p.v.d.aalst@tue.nl
Disco
Zoom:
67%
event log can be stored as XES or MXML and used in ProM
initial model is mined instantly
Process Map
Event Log
Export log as:
XES (ProM 6)
Minimize file size
Add endpoints
Anonymize
Cancel
Export XES file...
Filter
Animation
Copy
Delete
Export
Version 1.6.7

seamless zoom for activities and paths

Disco - New project
amc
Map
Statistics
Cases
Academic
w.m.p.v.d.aalst@tue.nl
Disco
Zoom:
427%
search...
Detail
Activities
Paths
0%
0%
Frequency
Show:
Absolute frequency
1955
1466
977
488
530
397
265
132
Performance
267
66
VERV.CONSULT 411100
676
285
TARIEF CONS. 419100
495
178
220
Filter
Animation
Copy
Delete
Export
Version 1.6.7

Disco - New project

amc

Map | Statistics | Cases

Academic
w.m.p.v.d.aalst@tue.nl

Disco

Zoom: 79%

search...

Detail

Activities | Paths

11.6% | 0%

Frequency

Show: Absolute frequency

1955	530
1466	397
977	265
488	132

Performance

Filter | Animation | Copy | Delete | Export

Version 1.6.7

Disco - New project
amc
Map
Statistics
Cases
Academic
w.m.p.v.d.aalst@tue.nl
Disco
Zoom:
79%
search...
Detail
Activities
Paths
11.6%
0%
Show:
Mean duration
Total duration
Median duration
Mean duration
Max. duration
33.3 d
16.6 d
Filter
Animation
Copy
Delete
Export
Version 1.6.7
duration (mean, total, median, max.)
red parts take most time

CT ABDOM.MC 387042A → VERV. CONSULT 411100
Frequency
Absolute frequency 20
Case frequency 20
Max. repetitions 1
Performance
Total duration 22.4 mths
Median duration 8 d
Mean duration 34 d
Max. duration 17.6 wks
Filter this path...
THORAX 2R 386002
11.3 d
IE CONSULT 410100
TARIEF CONS. 419100
28.2 d
TEL.CONS. NO 415100
83.2 d
VERV.CONSULT 411100
34 d
AANNAME LAB 370000
34.1 hrs
77.4 mins
2.3 hrs
HAEMOGLOB. S 370765
ORDERTARIEF 379999
12 hrs
14.6 hrs
KLASSE 3B 610000
LEUCOREDC S 377215
CA-125 MEIA 376619A
SCC EIA 376460A
55.3 mins
REGIO-TOESL. 614400
DIFF.AUTOM. 370701
CEA MEIA BL 376600D
2.1 hrs
20.1 hrs
LIGDAGTARIEF 40014
TROMBO S 370715S
49.3 hrs
4.2 hrs
KRUISPR. 375075
KLIN.OPNAME 610001
ASHERY. SCR. 376607
ABO RH 370604
RH-D CENTRIF 370606

all kinds of statistics

e.g. events over time

Disco - New project

amc

Map | Statistics | Cases

Academic
w.m.p.v.d.aalst@tue.nl

Disco

Statistics views

- Overview — Global statistics
- Activity — Activity classes
- Resource — Resource classes

Overview

Global statistics

- Events over time
- Active cases over time
- Case variants
- Events per case
- Case duration

Events	24,331
Cases	627
Activities	376
Median case duration	11.1 d
Mean case duration	57.6 d
Start	05.01.2005 00:00:00
End	28.03.2007 01:00:00

Cases (627) | Variants (32

Case ID	Events	Started	Duration
PROCINST.0	3	15.03.2006 00:00:00	0 millis
PROCINST.1	120	14.04.2005 01:00:00	209 days
PROCINST.2	1	12.07.2006 01:00:00	0 millis
PROCINST.3	2	13.07.2005 01:00:00	0 millis
PROCINST.4	4	24.02.2005 00:00:00	21 days
PROCINST.5	109	10.01.2005 00:00:00	32 days
PROCINST.6	1	27.10.2005 01:0	
PROCINST.7	7	19.04.2006 01	
PROCINST.8	93	12.01.2005 00	
PROCINST.9	9	05.08.2005 01	
PROCINST.10	158	09.11.2005 00	
PROCINST.11	5	11.01.2006 00	
PROCINST.12	10	23.02.2006 00	
PROCINST.13	360	13.03.2006 00	
PROCINST.14	32	08.02.2006 00	
PROCINST.15	3	14.03.2006 00	
PROCINST.16	119	13.04.2005 01	
PROCINST.17	2	12.10.2006 01	
PROCINST.18	2	11.01.2006 00	
PROCINST.19	2	19.01.2006 00:0	
PROCINST.20	2	14.04.2005 01:00:00	0 millis
PROCINST.21	3	28.06.2005 01:00:00	148 days
PROCINST.22	8	20.02.2006 00:00:00	84 days
PROCINST.23	2	30.11.2005 00:00:00	0 millis
PROCINST.24	2	25.01.2006 00:00:00	0 millis
PROCINST.25	2	15.03.2006 00:00:00	0 millis
PROCINST.26	5	28.08.2005 01:00:00	101 days
PROCINST.27	2	30.11.2005 00:00:00	0 millis
PROCINST.28	8	21.07.2005 01:00:00	83 days
PROCINST.29	10	10.10.2005 01:00:00	24 days
PROCINST.30	25	25.05.2005 01:00:00	139 days

case durations

Filter | Copy | Delete | Export

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Map | Statistics | Cases

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Disco

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Activity

Activity event classes

Activities	376
Minimal frequency	1
Median frequency	37
Mean frequency	64.71
Maximal frequency	2,444
Frequency std. deviation	211.82

All activities (376) | First in case (57) | Last in case (35)

Activity	Frequency	Relative frequency
AANNAME LAB 370000	2444	10.04 %
LIGDAGTARIEF 40014	1745	7.17 %
ORDERTARIEF 379999	1443	5.93 %
KLASSE 3B 613000	1388	5.7 %
REGIO-TOESL. 614400	1065	4.38 %
VERV.CONSULT 411100	676	2.78 %
HAEMOGLOB. S 370701S	502	2.06 %
TARIEF CONS. 419100	495	2.03 %
NATRIUM VLAM 370442	494	2.03 %
KALIUM POTEN 370443	490	2.01 %
CREATININE 370419	483	1.99 %
HB FOTOELEKT 370407D	410	1.69 %
KALIUM S 370443S	379	1.56 %
NATRIUM S 370442S	373	1.53 %
KLIN.OPNAME 610001	312	1.28 %
LEUCO ELEC S 377121S	294	1.21 %
KRUISPR. 375075	[illegible]	1.2 %
TROMBO S 370715S	[illegible]	1.19 %
LEUKO TELLEN 370712B	[illegible]	1.19 %
ABO RH 370604	[illegible]	1.18 %
RH-D CENTRIF 370606	[illegible]	1.18 %
AS-ERY. SCR. 378607	[illegible]	1.17 %
DIFF.AUTOM. 370701	[illegible]	1.17 %
TROMB TELLEN 370715A	[illegible]	1.08 %
KLASSE 3A 612000	[illegible]	1.03 %
UREUM 370403	[illegible]	1.01 %
CALCIUM 377498A	[illegible]	0.99 %
ALBUMINE 378453A	[illegible]	0.98 %
CALCIUM S 370426S	[illegible]	0.97 %
O2-SATURATIE 378458	[illegible]	0.94 %
ONDERZ.KWEEK 370504A	[illegible]	0.94 %
SGPT-ALAT 370488G	217	0.89 %
GLUCOSE 370402	215	0.88 %

activity frequencies

Filter | Copy | Delete | Export

Version 1.6.7

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amc

Map | Statistics | Cases

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Disco

Statistics views

- Overview — Global statistics
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- Resource — Resource classes

Resource

Resource event classes

Resources	36
Minimal frequency	1
Median frequency	16.75
Mean frequency	675.86
Maximal frequency	15,540
Frequency std. deviation	2,688.89

All resources (36) | First in case (12) | Last in case (11)

Resource	Frequency	Relative frequency
Algemeen Lab Klinische Chemie	15540	63.87 %
GYNAECOLOGIE H5Z	4909	20.18 %
Polikliniek Verlosk.-Gyn.	1771	7.28 %
Medische Microbiologie	627	2.58 %
Radiologie	433	[illegible] %
Pathologie	375	1.54 %
Operatiekamers	152	0.62 %
Verkoever/High Care	89	0.37 %
Apotheek Laboratorium	80	0.33 %
Nucleaire Geneeskunde	61	0.25 %
IC Volwassenen	60	0.25 %
Specieel Lab Endo/Radio		0.19 %
Hart- en Vaat poliklinieken		0.19 %
		0.16 %
		0.07 %
		0.06 %
		0.05 %
		0.04 %
		0.03 %
		0.03 %
		0.02 %
		0.02 %
		0.02 %
		0.01 %
		0.01 %
		0.01 %
		0.01 %
		0.01 %
		0.01 %
		0 %
		0 %
Poli CHI/URO A1-3	1	0 %
Verpleegafdeling G5Z	1	0 %

distribution of work over departments

Filter | Copy | Delete | Export

Version 1.6.7

all events of a particular case

time window of case

filtering:
very important for interacting with the data

different types of filters

Disco - New project
Disco
Filter settings for: amc
Active filters
Timeframe
Filters by timestamp
click to add filter...
Reset
Undo changes
Timeframe
Filters by timestamp
time filter
January 2005
Mon Tue Wed Thu Fri Sat Sun
00 : 00 : 00
Keep cases:
Contained in timeframe
Intersecting timeframe
Started in timeframe
Completed in timeframe
Trim to timeframe
March 2007
Mon Tue Wed Thu Fri Sat Sun
01 : 00 : 00
Cancel
Copy and filter
Apply filter

Disco - New project
Disco
Filter settings for: amc
Active filters
Timeframe
Filters by timestamp
click to add filter...
Reset
Undo changes
Timeframe
Filters by timestamp
Keep cases:
Contained in timeframe
Intersecting timeframe
Started in timeframe
Completed in timeframe
Trim to timeframe
May 2006
Mon Tue Wed Thu Fri Sat Sun
00 : 00 : 00
17 : 36 : 55
Cancel
Copy and filter
Apply filter

4 types

Keep cases:

- (●) Contained in timeframe
- ( ) Intersecting timeframe
- ( ) Started in timeframe
- ( ) Completed in timeframe
- ( ) Trim to timeframe

Keep cases:

- ( ) Contained in timeframe
- (●) Intersecting timeframe
- ( ) Started in timeframe
- ( ) Completed in timeframe
- ( ) Trim to timeframe

Keep cases:

- ○ Contained in timeframe
- ○ Intersecting timeframe
- ◉ Started in timeframe
- ○ Completed in timeframe
- ○ Trim to timeframe

Keep cases:

- ○ Contained in timeframe
- ○ Intersecting timeframe
- ○ Started in timeframe
- ◉ Completed in timeframe
- ○ Trim to timeframe

Keep cases:

- ○ Contained in timeframe
- ○ Intersecting timeframe
- ○ Started in timeframe
- ○ Completed in timeframe
- ◉ Trim to timeframe

Disco - New project
Disco
Filter settings for: amc
Active filters
Performance
Filters cases by performance
click to add filter...
Performance
Filters cases by performance
Filter cases by: Case duration
Short cases
Long-running cases
100 days
Minimum duration
23%
of cases
348 days, 9 hours
Maximum duration
Use cases running longer than 100 days.
Reset
Undo changes
Cancel
Copy and filter
Apply filter
cases that took longer than 100 days

cases/events (not) having particular attributes

removing mainstream or exceptional cases

filtering based on patterns

Disco - New project
amc
Map
Statistics
Cases
Academic
w.m.p.v.d.aalst@tue.nl
Disco
Zoom:
321%
GYN.-JAAR-KO 10307
instant
63.6 d
VERV.CONSULT 411100
instant
instant
9.6 d
TARIEF CONS. 419100
instant
resulting event log can also be stored and analyzed using ProM
Filter
36%
Cases
1%
Events
Animation
Copy
Delete
Export
Version 1.6.7

Disco - New project
Disco
Exit
Animation for amc
Zoom:
80%
replaying the event log using Disco
23:39:44
Sun 30 Oct '05
slow
fast
Export

<<add animation 3>>

spectrum of tools
two powerful examples

Part I: Introduction

Chapter 1
Data Science in Action

Chapter 2
Process Mining: The Missing Link

Part II: Preliminaries

Chapter 3
Process Modeling and Analysis

Chapter 4
Data Mining

Part III: From Event Logs to Process Models

Chapter 5
Getting the Data

Chapter 6
Process Discovery: An Introduction

Chapter 7
Advanced Process Discovery Techniques

Part IV: Beyond Process Discovery

Chapter 8
Conformance Checking

Chapter 9
Mining Additional Perspectives

Chapter 10
Operational Support

Part V: Putting Process Mining to Work

Chapter 11
Process Mining Software

Chapter 12
Process Mining in the Large

Chapter 13
Analyzing "Lasagna Processes"

Chapter 14
Analyzing "Spaghetti Processes"

Part VI: Reflection

Chapter 15
Cartography and Navigation

Chapter 16
Epilogue

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