

# Advanced Process Mining

Sommer term 2020

## Exercise sheet 7

Predictive Process Monitoring

# Sequence encoding

## Exercise 1a

In the following event log, identify case and event attributes of the three shown cases.

Case ID	Timestamp	Activity	Resource	Pulse	Medication	Gender	Age
1	01.05.2020	Admission	ER	40	-	Male	86
1	01.05.2020	Surgery	OR	30	Propofol	Male	86
1	01.05.2020	CPR	OR	0	Epinephrine	Male	86
1	01.05.2020	ToD	OR	0	-	Male	86
2	05.05.2020	Admission	ER	60	-	Female	80
2	05.05.2020	Surgery	OR	70	Bupivacaine	Female	80
2	05.05.2020	Recovery	PACU	55	Saline	Female	80
3	06.05.2020	Admission	ER	80	-	Female	75
3	06.05.2020	IV Fluids	ER	70	Saline	Female	75
3	06.05.2020	Release	Geriatrics	65	-	Female	75
2	10.05.2020	Release	Geriatrics	60	Ibuprofen	Female	80

# Sequence encoding

## Exercise 1a

In the following event log, identify case and event attributes of the three shown cases.

Case Attr.	Event Attr.	Event Attr.	Event Attr.	Event Attr.	Event Attr.	Case Attr.	Case Attr.
Case ID	Timestamp	Activity	Resource	Pulse	Medication	Gender	Age
1	01.05.2020	Admission	ER	40	-	Male	86
...	...	...	...	...	...	...	...
1	01.05.2020	ToD	OR	0	-	Male	86
2	05.05.2020	Admission	ER	60	-	Female	80
...	...	...	...	...	...	...	...
3	06.05.2020	Admission	ER	80	-	Female	75
...	...	...	...	...	...	...	...
3	06.05.2020	Release	Geriatrics	65	-	Female	75
2	10.05.2020	Release	Geriatrics	60	Ibuprofen	Female	80

# Sequence encoding

## Exercise 1b

Transform the following event log into an index-based encoded table

Case ID	Timestamp	Activity	Pulse	Gender	Age
1	01.05.2020	Admission	40	Male	86
1	01.05.2020	Surgery	30	Male	86
1	01.05.2020	CPR	0	Male	86
1	01.05.2020	ToD	0	Male	86
2	05.05.2020	Admission	60	Female	80
2	05.05.2020	Surgery	70	Female	80
2	05.05.2020	Recovery	55	Female	80
3	06.05.2020	Admission	80	Female	75
3	06.05.2020	IV Fluids	70	Female	75
3	06.05.2020	Release	65	Female	75
2	10.05.2020	Release	60	Female	80

# Sequence encoding

## Exercise 1b

Transform the following event log into an index-based encoded table

Case ID	Timestamp	Activity	Pulse	Gender	Age
1	01.05.2020	Admission	40	Male	86
1	01.05.2020	Surgery	30	Male	86
1	01.05.2020	CPR	0	Male	86
1	01.05.2020	ToD	0	Male	86
2	05.05.2020	Admission	60	Female	80
2	05.05.2020	Surgery	70	Female	80
2	05.05.2020	Recovery	55	Female	80
3	06.05.2020	Admission	80	Female	75
3	06.05.2020	IV Fluids	70	Female	75
3	06.05.2020	Release	65	Female	75
2	10.05.2020	Release	60	Female	80


# Sequence encoding

## Exercise 1b

Transform the following event log into an index-based encoded table

Case ID	Timestamp	Activity	Pulse	Gender	Age
1	01.05.2020	Admission	40	Male	86
1	01.05.2020	Surgery	30	Male	86
1	01.05.2020	CPR	0	Male	86
1	01.05.2020	ToD	0	Male	86
2	05.05.2020	Admission	60	Female	80
2	05.05.2020	Surgery	70	Female	80
2	05.05.2020	Recovery	55	Female	80
3	06.05.2020	Admission	80	Female	75
3	06.05.2020	IV Fluids	70	Female	75
3	06.05.2020	Release	65	Female	75
2	10.05.2020	Release	60	Female	80

ID	Gender	Age	Time <sub>1</sub>	Time <sub>2</sub>	Time <sub>3</sub>	Time <sub>4</sub>	Act <sub>1</sub>	Act <sub>2</sub>	Act <sub>3</sub>	Act <sub>4</sub>	Pulse <sub>1</sub>	Pulse <sub>2</sub>	Pulse <sub>3</sub>	Pulse <sub>4</sub>
1	Male	86	01.05.	01.05.	01.05.	01.05.	Admission	Surgery	CPR	ToD	40	30	0	0
2	Female	80	05.05.	05.05.	05.05.	05.05.	Admission	Surgery	Recovery	Release	60	70	55	60
3	Female	75	06.05.	06.05.	06.05.	-	Admission	IV Fluids	Release	-	80	70	65	-

# Sequence encoding

## Exercise 1c

Transform the event log into an aggregation encoded table.

Case ID	Timestamp	Activity	Resource	Pulse	Medication	Gender	Age
1	01.05.2020	Admission	ER	40	-	Male	86
1	01.05.2020	Surgery	OR	30	Propofol	Male	86
1	01.05.2020	CPR	OR	0	Epinephrine	Male	86
1	01.05.2020	ToD	OR	0	-	Male	86
2	05.05.2020	Admission	ER	60	-	Female	80
2	05.05.2020	Surgery	OR	70	Bupivacaine	Female	80
2	05.05.2020	Recovery	PACU	55	Saline	Female	80
3	06.05.2020	Admission	ER	80	-	Female	75
3	06.05.2020	IV Fluids	ER	70	Saline	Female	75
3	06.05.2020	Release	Geriatrics	65	-	Female	75
2	10.05.2020	Release	Geriatrics	60	Ibuprofen	Female	80




# Sequence encoding

## Exercise 1c

Transform the event log into an aggregation encoded table.

Case ID	Timestamp	Activity	Resource	Pulse	Medication	Gender	Age
1	01.05.2020	Admission	ER	40	-	Male	86
1	01.05.2020	Surgery	OR	30	Propofol	Male	86
1	01.05.2020	CPR	OR	0	Epinephrine	Male	86
1	01.05.2020	ToD	OR	0	-	Male	86
2	05.05.2020	Admission	ER	60	-	Female	80
2	05.05.2020	Surgery	OR	70	Bupivacaine	Female	80
2	05.05.2020	Recovery	PACU	55	Saline	Female	80
3	06.05.2020	Admission	ER	80	-	Female	75
3	06.05.2020	IV Fluids	ER	70	Saline	Female	75
3	06.05.2020	Release	Geriatrics	65	-	Female	75
2	10.05.2020	Release	Geriatrics	60	Ibuprofen	Female	80

A possible aggregation of the original event log could look like the following:

ID	Gender	Age	<i>count</i> (OR)	<i>min</i> (Pulse)	<i>max</i> (Pulse)	<i>count</i> (Medication)	<i>count</i> (ToD)
1	Male	86	3	0	40	2	1
2	Female	80	1	55	70	3	0
3	Female	75	0	65	80	2	0



Why could it be useful to apply predictive process monitoring in this scenario?

Predictive process monitoring could be useful in this scenario to predict the outcome of a hospital treatment. In this case the prediction if a patient dies or survives will be something to observe.