RUTGERS
THE STATE UNIVERSITY
OF NEW JERSEY

Recent Work Presentation

Presented by Jingsong Yuan

Tasks List

① Log Trace Visualization 1 & Histograms & Boxplots

② Boxplot

③ NonRoutineEvent Visualization

④ Computing First-Order & Second-Order Transition Matrix

⑤ Data Generator

⑥ Histograms & Boxplots

⑦ Log Trace Visualization 2 & Historgrams (With Duration)

⑧ Occurrence of Activity Counter

Task 1: Draw a log trace for all cases without duration

Data Set:

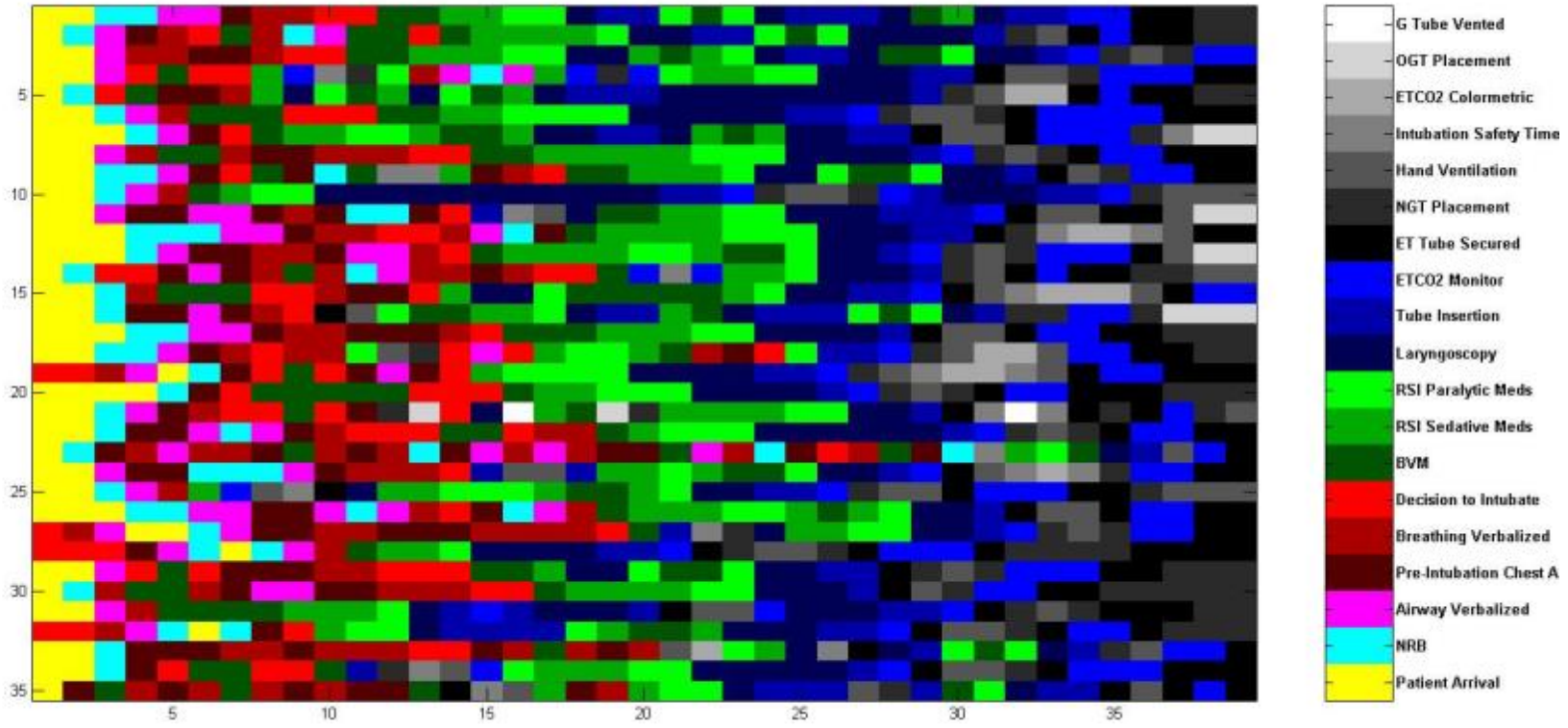
	A	B	C	D
1	Study ID	start time	end time	occurrence
2	2014001	0:00:00	0:00:01	Patient Arrival
3	2014001	0:00:00	0:06:42	NRB
4	2014001	0:00:57	0:00:58	Airway Verbalized
5	2014001	0:01:10	0:01:36	Pre-Intubation Chest Auscultatio
6	2014001	0:01:49	0:01:50	Breathing Verbalized
7	2014001	0:06:22	0:06:23	Decision to Intubate
8	2014001	0:06:44	0:10:07	BVM
9	2014001	0:07:53	0:08:13	RSI Sedative Meds
10	2014001	0:08:16	0:08:41	RSI Paralytic Meds
11	2014001	0:10:21	0:10:52	Laryngoscopy
12	2014001	0:10:36	0:10:51	Tube Insertion
13	2014001	0:10:55	0:11:10	BVM

Method:

1. Show all the activities in the sequential order in each case. Each color represents one activity.
2. Resize every case length to equal length.

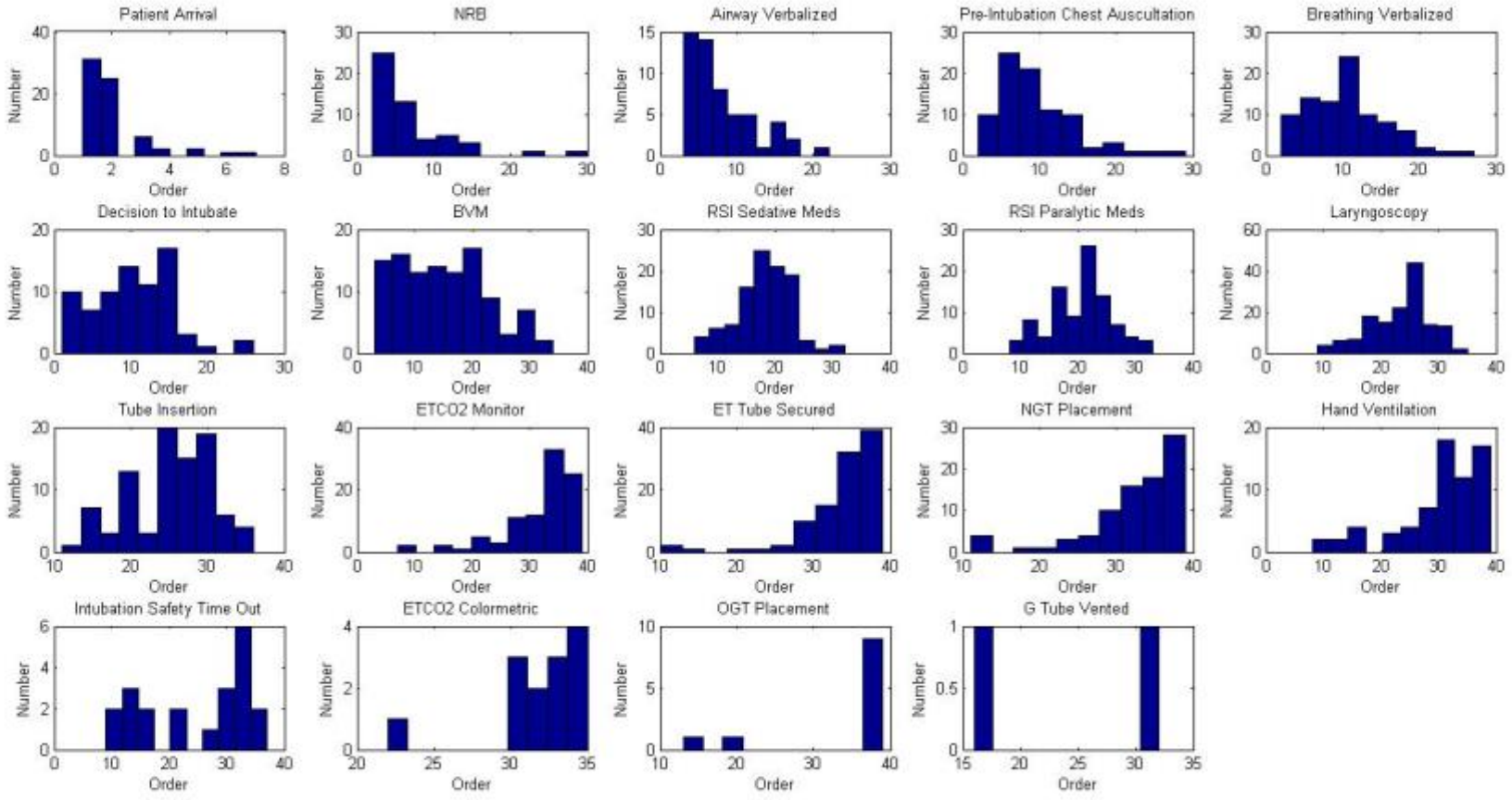
Task 1: Draw a log trace for all cases without duration

Result:



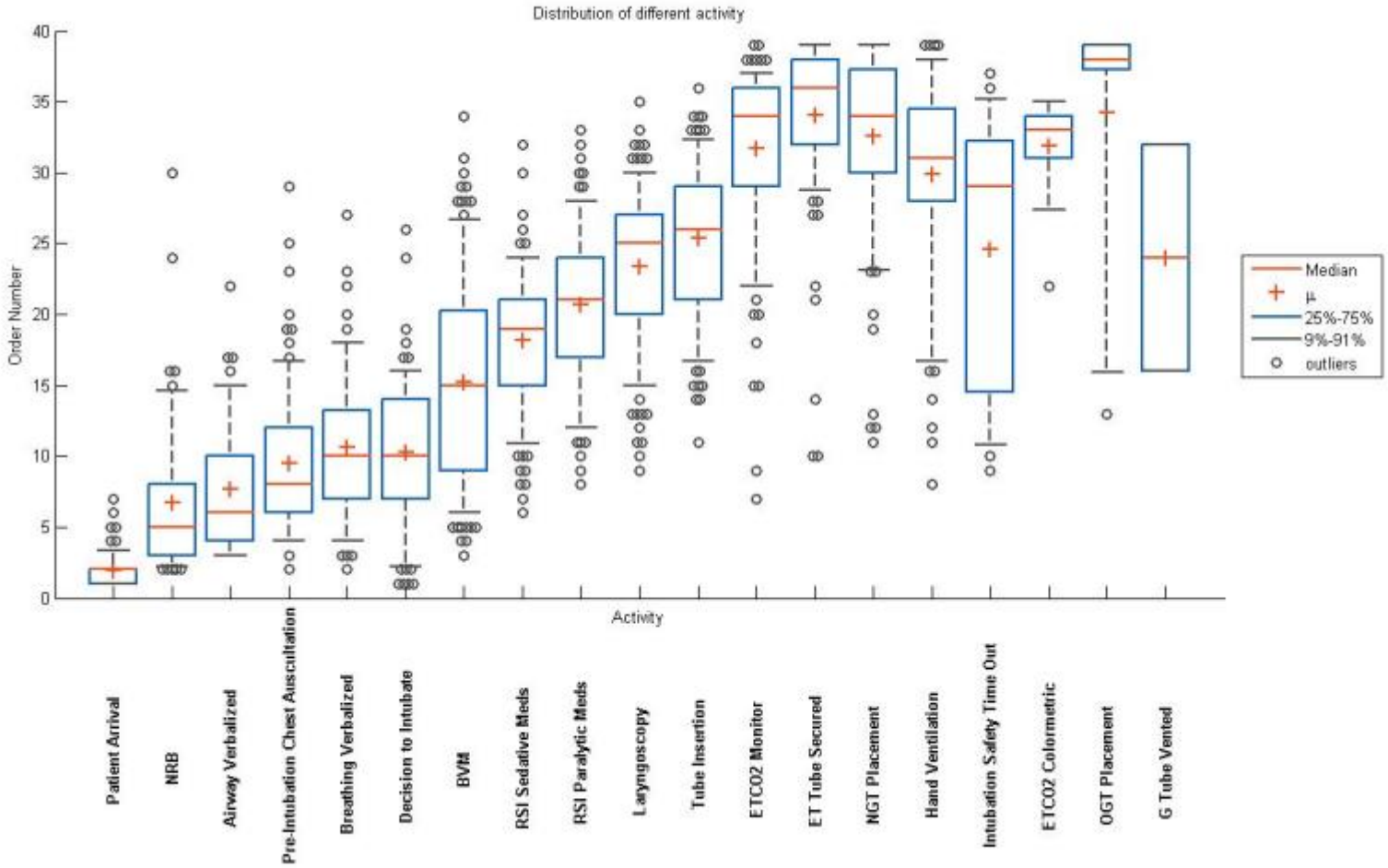
Task 1: Draw histograms of order for each activity

Result:



Task 1: Draw Boxplots to show the Distribution of activities

Result:



Task 3: NonRoutineEvent Visualization

DataSet:

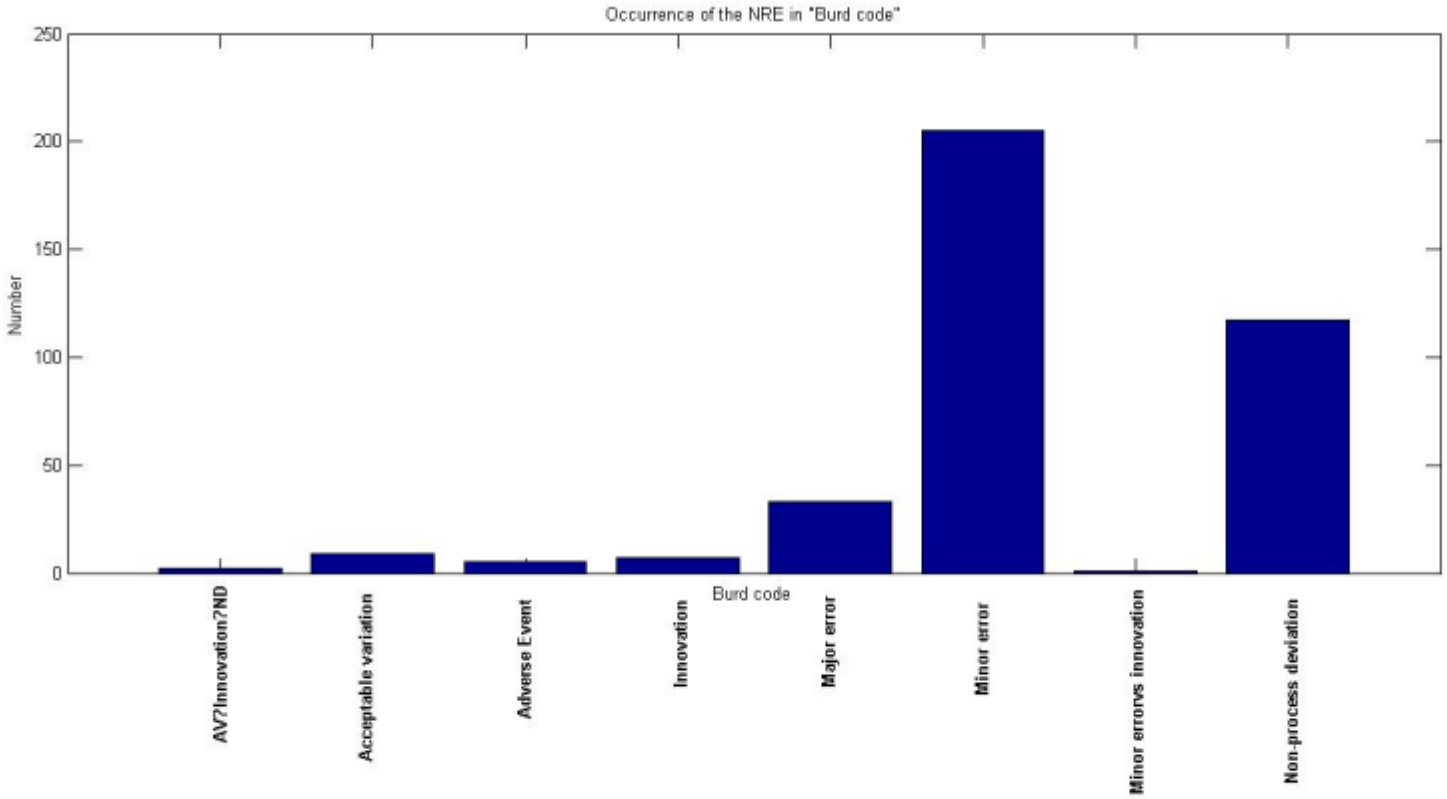
NRE time (hh:mm:ss)	Burd code	Classification
0:23:01	Non-process deviation	Delay
0:08:51	Non-process deviation	Interruption
0:13:44	Major error	Omission-partial
0:22:22	Major error	Omission-partial
0:14:42	Major error	Selection-priority
0:03:58	Non-process deviation	Abberent Personel
0:15:12	Non-process deviation	Interruption
0:29:58	Non-process deviation	Interruption
0:18:39	Non-process deviation	Interruption
0:21:20	Non-process deviation	Interruption
0:05:30	Non-process deviation	Interruption
0:23:01	Non-process deviation	Interruption
0:36:55	Non-process deviation	Interruption
0:09:45	Major error	Omission-total
0:10:02	Minor error	Selection-priority
0:10:27	Minor error	Selection-priority
0:17:25	Acceptable variation	Commission-redundar

Goal:

1. Distribution of all NRE based on time
2. Occurrence of the NRE in “Burd code”
3. Distribution of NRE based on classification

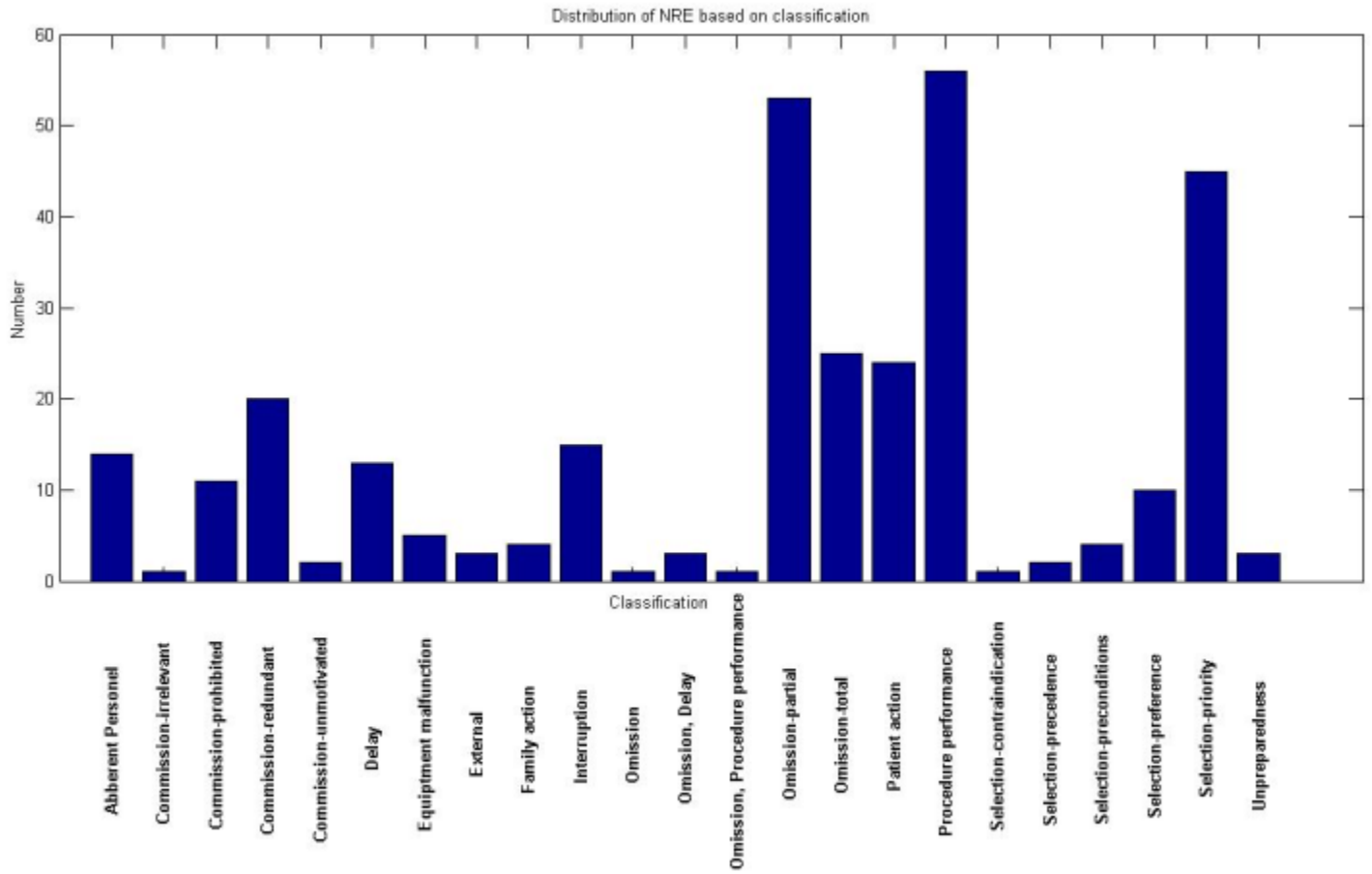
Task 3: NonRoutineEvent Visualization

Result:



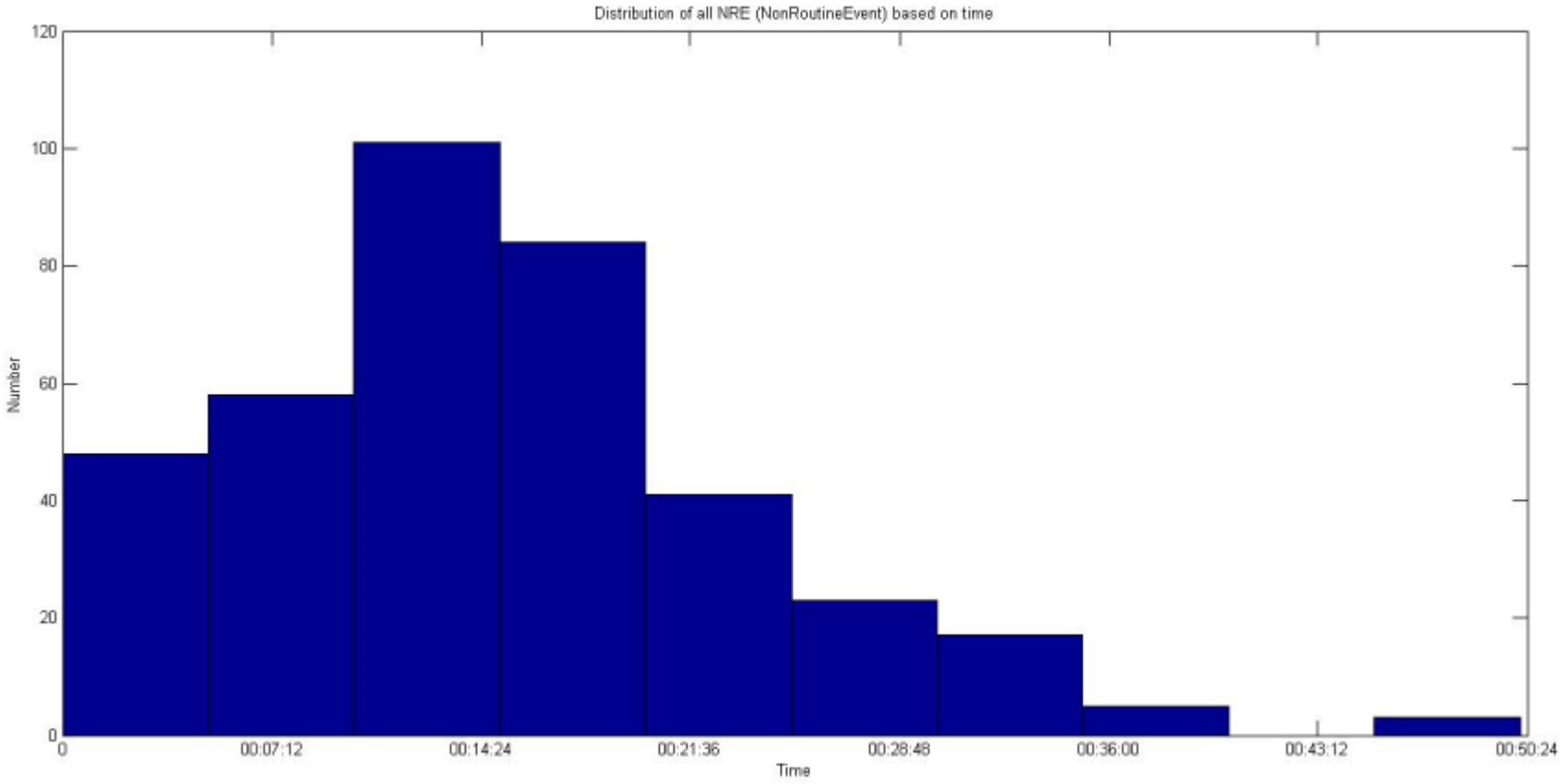
Task 3: NonRoutineEvent Visualization

Result:



Task 3: NonRoutineEvent Visualization

Result:



Task 4: Compute the transition matrix

DataSet:

	A	B	C
1	Case ID	Activity	Complete
2	140828	Miami-j c	0:11:06
3	140828	Visual as	0:11:50
4	140828	Cardiac L	0:11:56
5	140828	Chest vis	0:11:58
6	140828	Chest Aus	0:12:00
7	140828	Oxygen-BC	0:12:04
8	140828	R brachia	0:12:07
9	140828	R femoral	0:12:11
10	140828	Capillary	0:12:16
11	140828	MBP-BP	0:12:25
12	140828	Total Ver	0:12:27
13	140828	Clothing	0:12:38
14	140828	ABP Cuff	0:12:39
15	140828	Eyes Verb	0:12:53
16	140828	Verbal Ve	0:12:55
17	140828	Pulse Ox	0:12:55
18	140828	Motor Ver	0:13:01
19	140828	ABP-BP	0:13:17

Goal:

1. Calculate the first order transition matrix.
2. Calculate the second order transition matrix.

Task 5: Data Generator

Goal: Generate random data based on the first order transition matrix.

Method:

1. Calculate the initial state distribution based on the known dataset.
2. Calculate the state transition probability distribution based on the known dataset.
3. Input the case length and case number you want.
4. Output the generated data to a excel file.

Task 6:

1. Plot top 10 histograms of the occurrence of activity
2. Plot boxplot of occurrence of activity

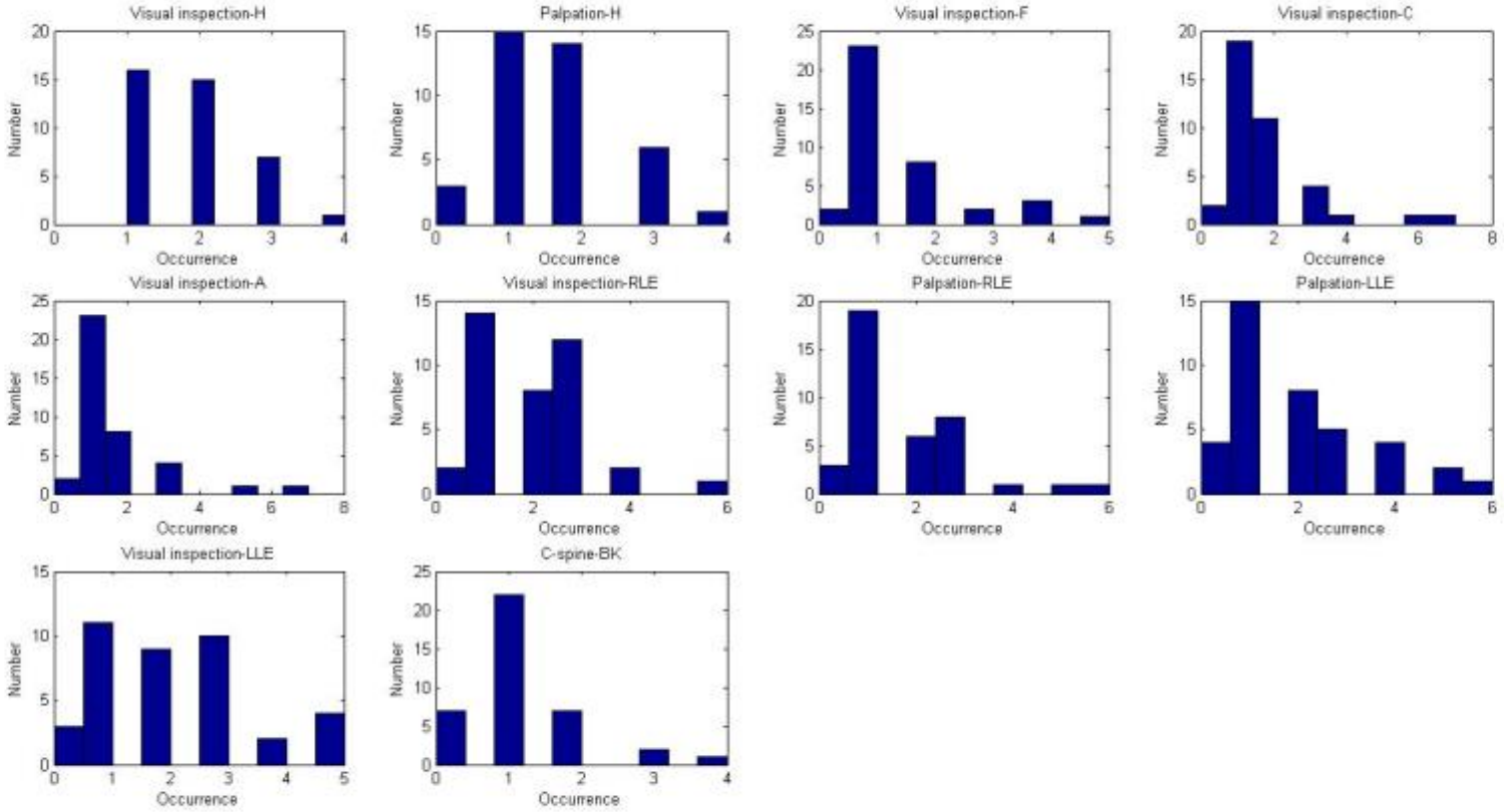
Data Set:

	A	B	C	D	E	F
	Case ID	start time	end time	category		
2	140828	00:11:50:03	00:11:57:15	Visual assessment-AA		
3	140828	00:12:00:35	00:12:03:07	Chest Auscultation-BA		
4	140828	00:12:27:99	00:12:29:03	Total Verbalized-GCS		
5	140828	00:13:18:30	00:13:31:25	Right pupil-PU		
6	140828	00:13:18:30	00:13:31:25	Left pupil-PU		
7	140828	00:13:37:98	00:13:43:78	Visual inspection-H		
8	140828	00:13:39:38	00:13:42:42	Palpation-H		
9	140828	00:13:48:46	00:14:09:25	Visual inspection-H		
10	140828	00:13:49:06	00:14:09:25	Palpation-H		
11	140828	00:14:12:19	00:14:21:30	R visual inspection-EY		
12	140828	00:14:12:88	00:14:20:38	L visual inspection-EY		
13	140828	00:14:12:89	00:14:17:19	Visual inspection-F		
14	140828	00:14:13:61	00:14:17:19	Palpation-F		
15	140828	00:14:18:82	00:14:20:86	L Visual inspection-EAR		
16	140828	00:14:19:41	00:14:20:89	R Visual inspection-EAR		
17	140828	00:14:21:62	00:14:23:70	R Visual inspection-EAR		
18	140828	00:14:26:55	00:14:29:83	Visual inspection-N		

Task 6:

1. Plot top 10 histograms of the occurrence of activity
2. Plot boxplot of occurrence of activity

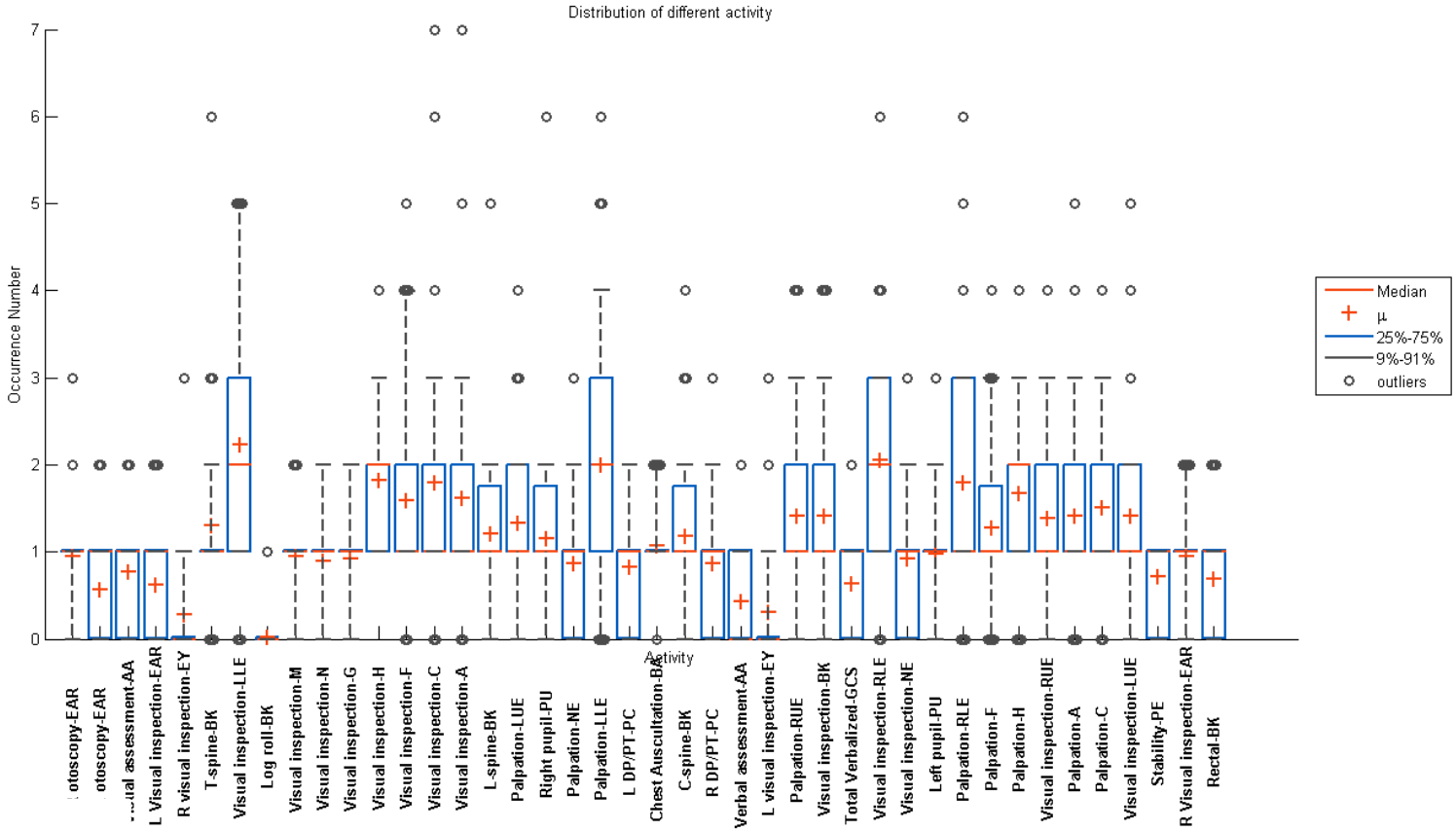
Result:



Task 6:

1. Plot top 10 histograms of the occurrence of activity
2. Plot boxplot of occurrence of activity

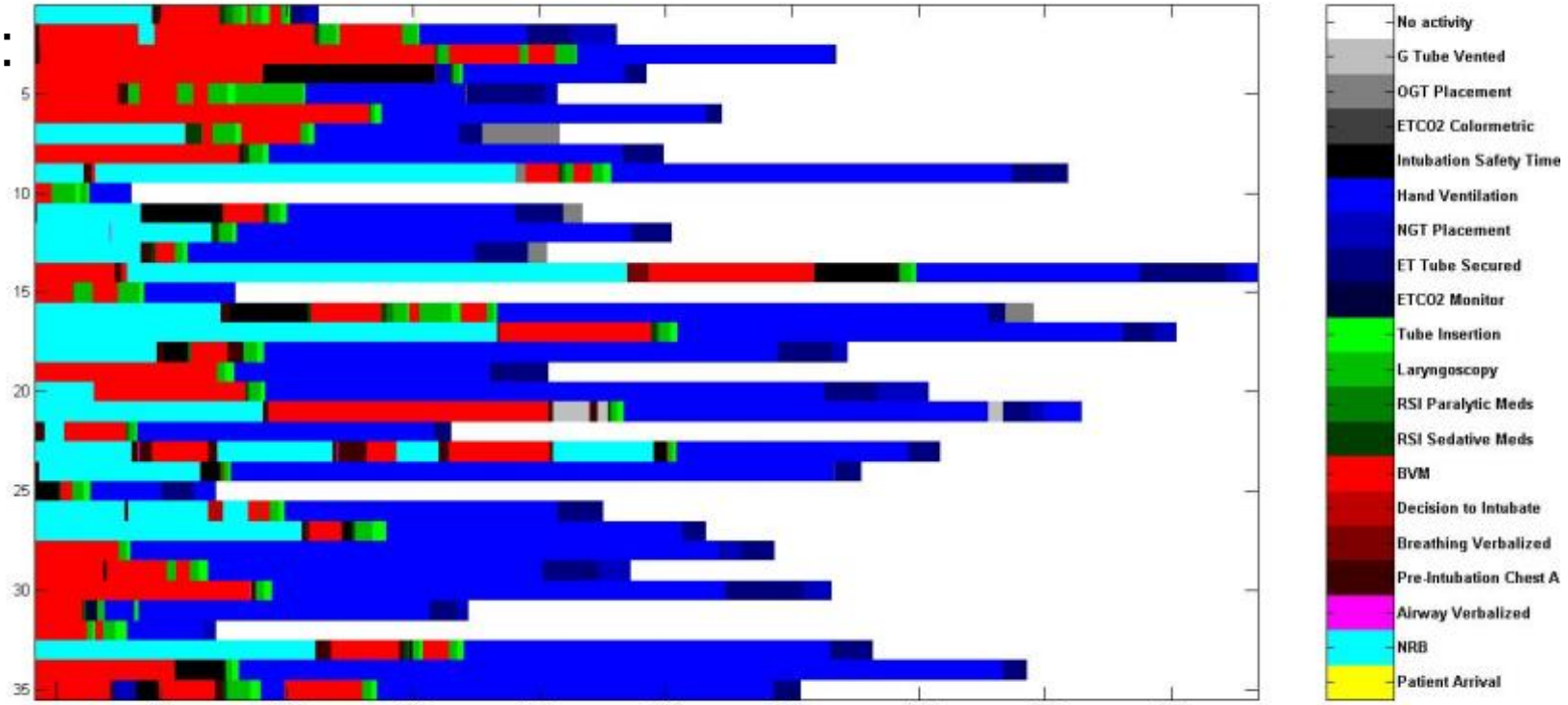
Result:



Task 7: Log Trace Visualization 2 & Historgrams (With Duration)

1. Plot log trace in task 1 with duration
2. Plot histogram for location with duration
3. Plot histogram for duration

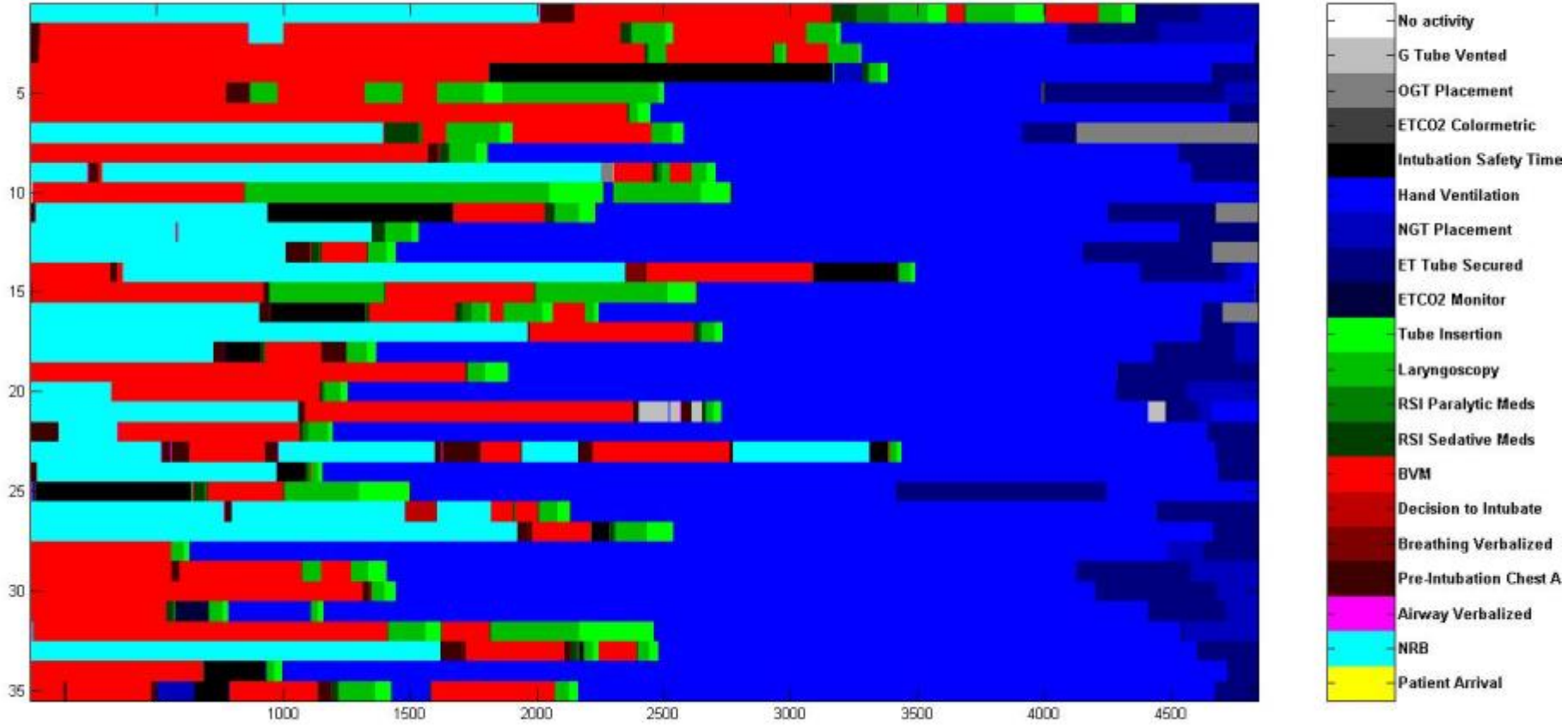
Result:



Task 7: Log Trace Visualization 2 & Historgrams (With Duration)

1. Plot log trace in task 1 with duration
2. Plot histogram for location with duration
3. Plot histogram for duration

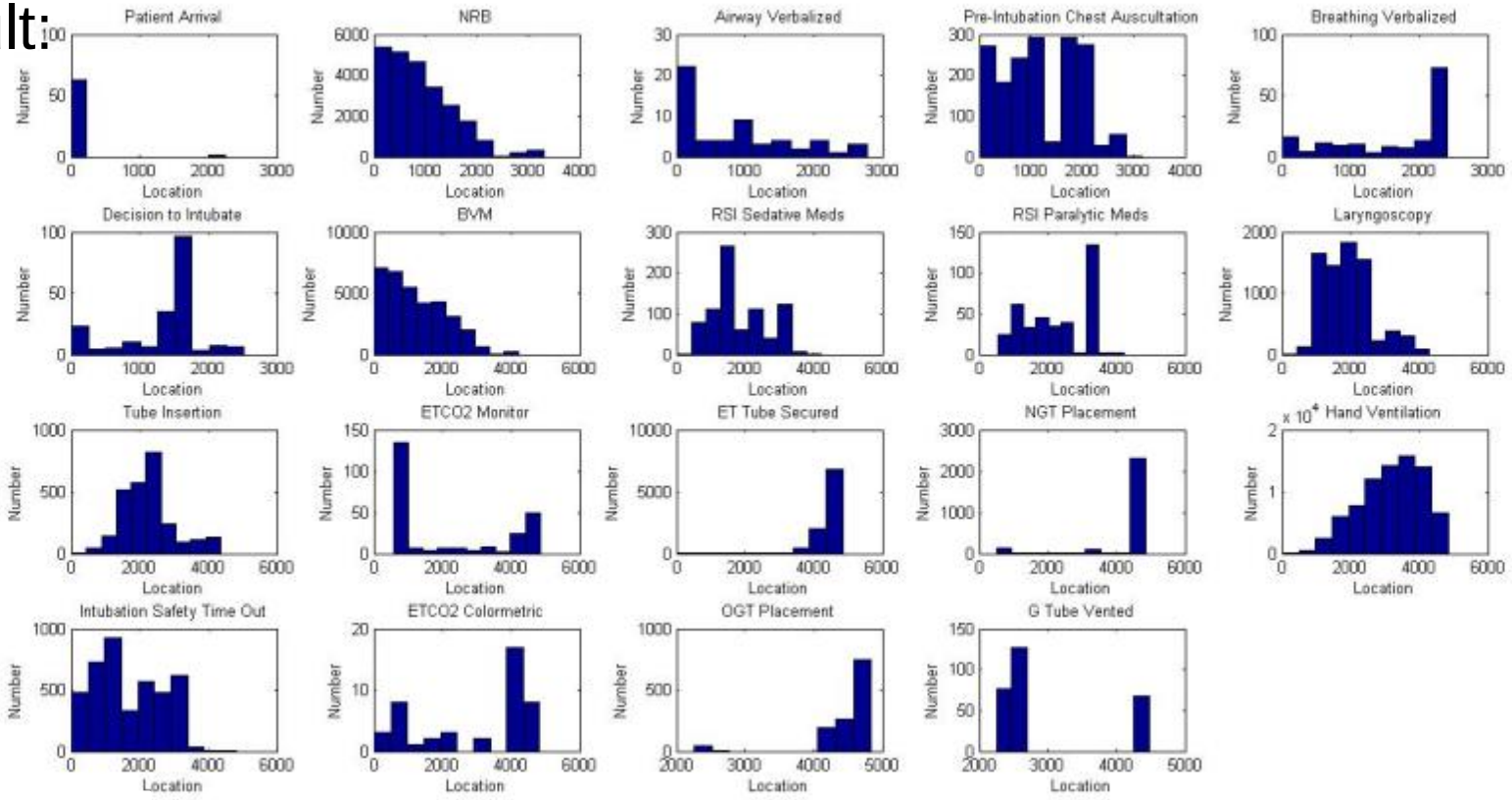
Result:



Task 7: Log Trace Visualization 2 & Historgrams (With Duration)

1. Plot log trace in task 1 with duration
2. Plot histogram for location with duration
3. Plot histogram for duration

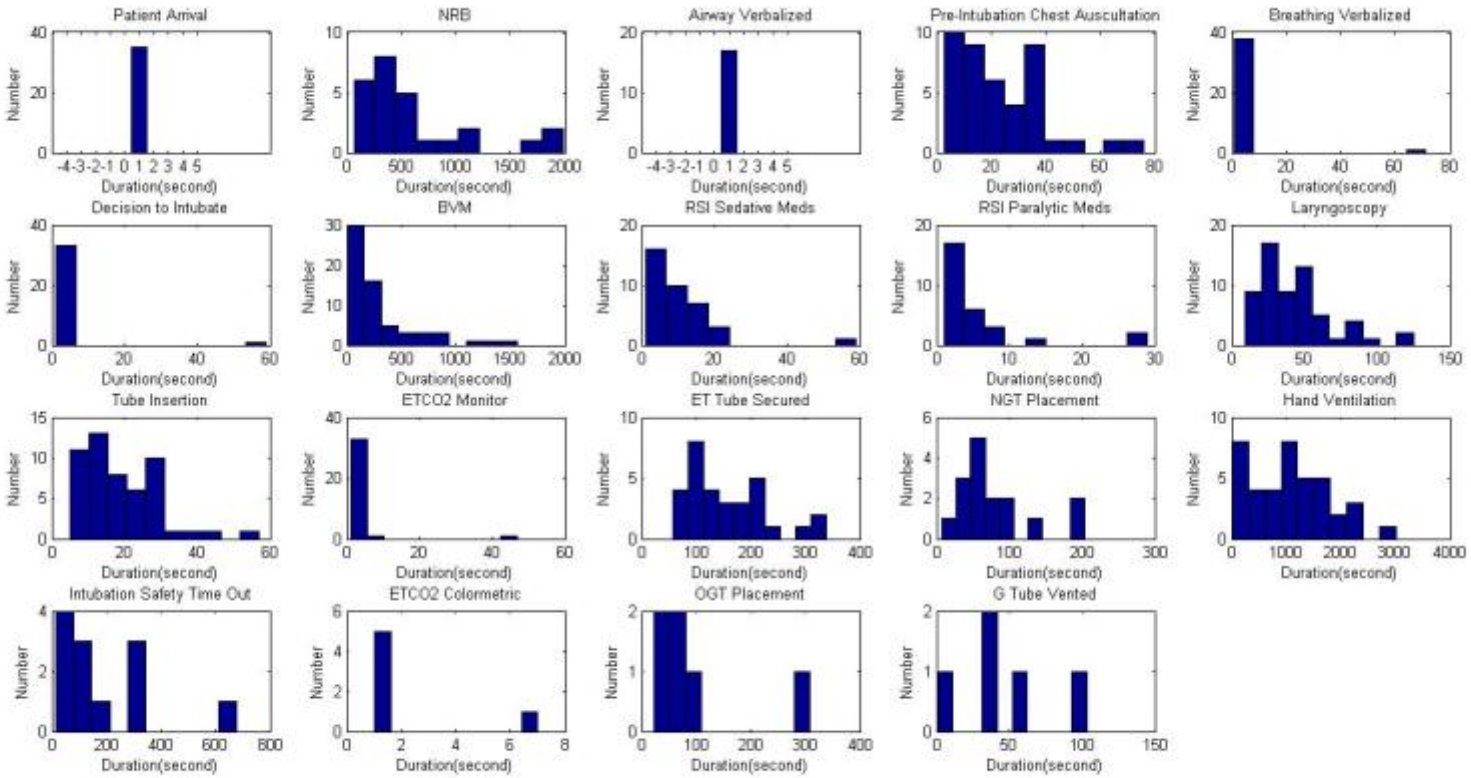
Result:



Task 7: Log Trace Visualization 2 & Historgrams (With Duration)

1. Plot log trace in task 1 with duration
2. Plot histogram for location with duration
3. Plot histogram for duration

Result:



Task 8: Count the occurrence number of activity

Data Set:

	A	B	C	D	E	F
1	Case ID	start tir	end time	category		
2	140828	00:11:50	00:11:57	Visual assessment-AA		
3	140828	00:12:00	00:12:03	Chest Auscultation-BA		
4	140828	00:12:27	00:12:29	Total Verbalized-GCS		
5	140828	00:13:18	00:13:31	Right pupil-PU		
6	140828	00:13:18	00:13:31	Left pupil-PU		
7	140828	00:13:37	00:13:43	Visual inspection-H		
8	140828	00:13:39	00:13:42	Palpation-H		
9	140828	00:13:48	00:14:09	Visual inspection-H		
10	140828	00:13:49	00:14:09	Palpation-H		
11	140828	00:14:12	00:14:21	R visual inspection-EY		
12	140828	00:14:12	00:14:20	L visual inspection-EY		
13	140828	00:14:12	00:14:17	Visual inspection-F		
14	140828	00:14:13	00:14:17	Palpation-F		
15	140828	00:14:18	00:14:20	L Visual inspection-EAR		
16	140828	00:14:19	00:14:20	R Visual inspection-EAR		
17	140828	00:14:21	00:14:23	R Visual inspection-EAR		
18	140828	00:14:26	00:14:29	Visual inspection-N		
19	140828	00:14:41	00:14:48	R otoscopy-EAR		

Method:

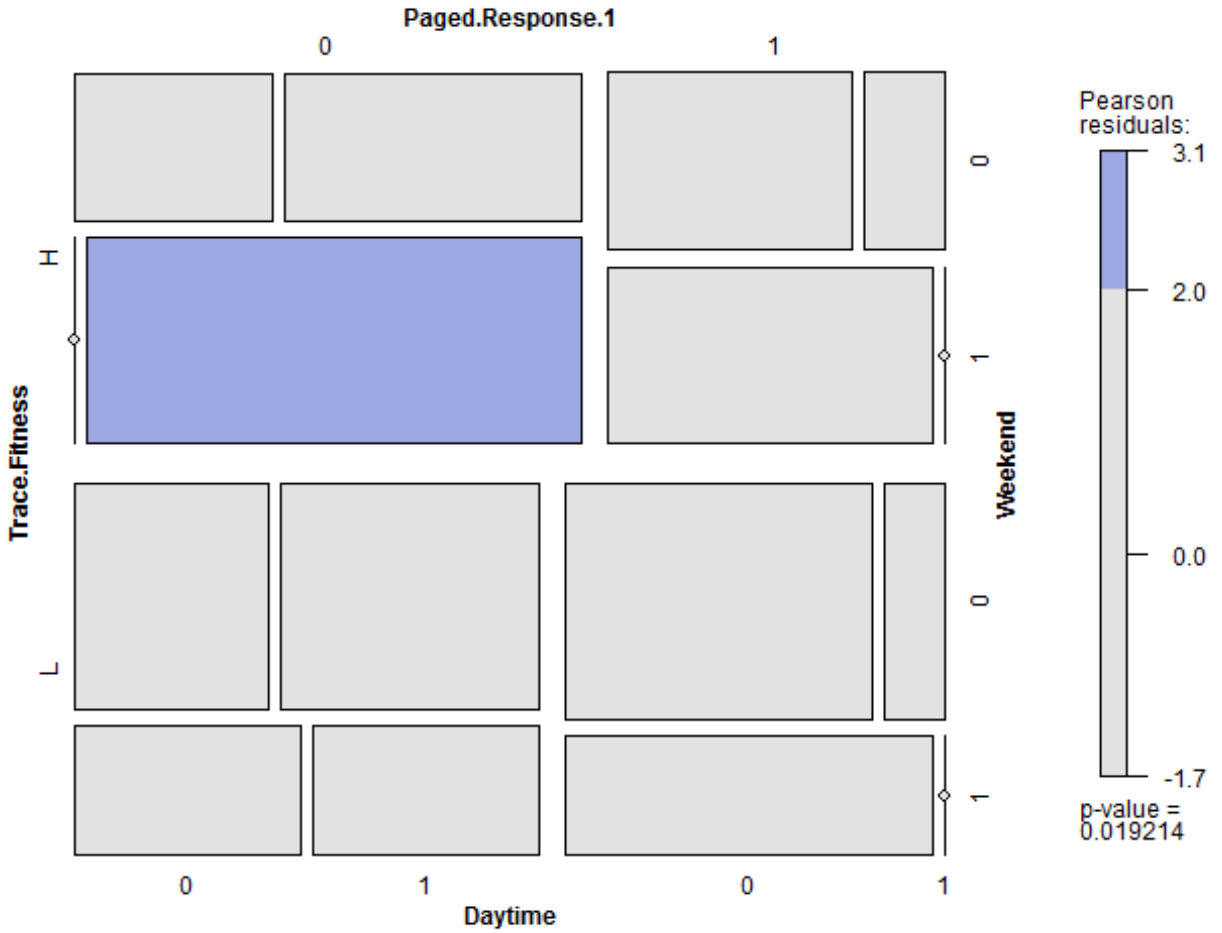
1. Count the occurrence number of each acitivity in one case.
2. Output the restult to the excel file.

Result:

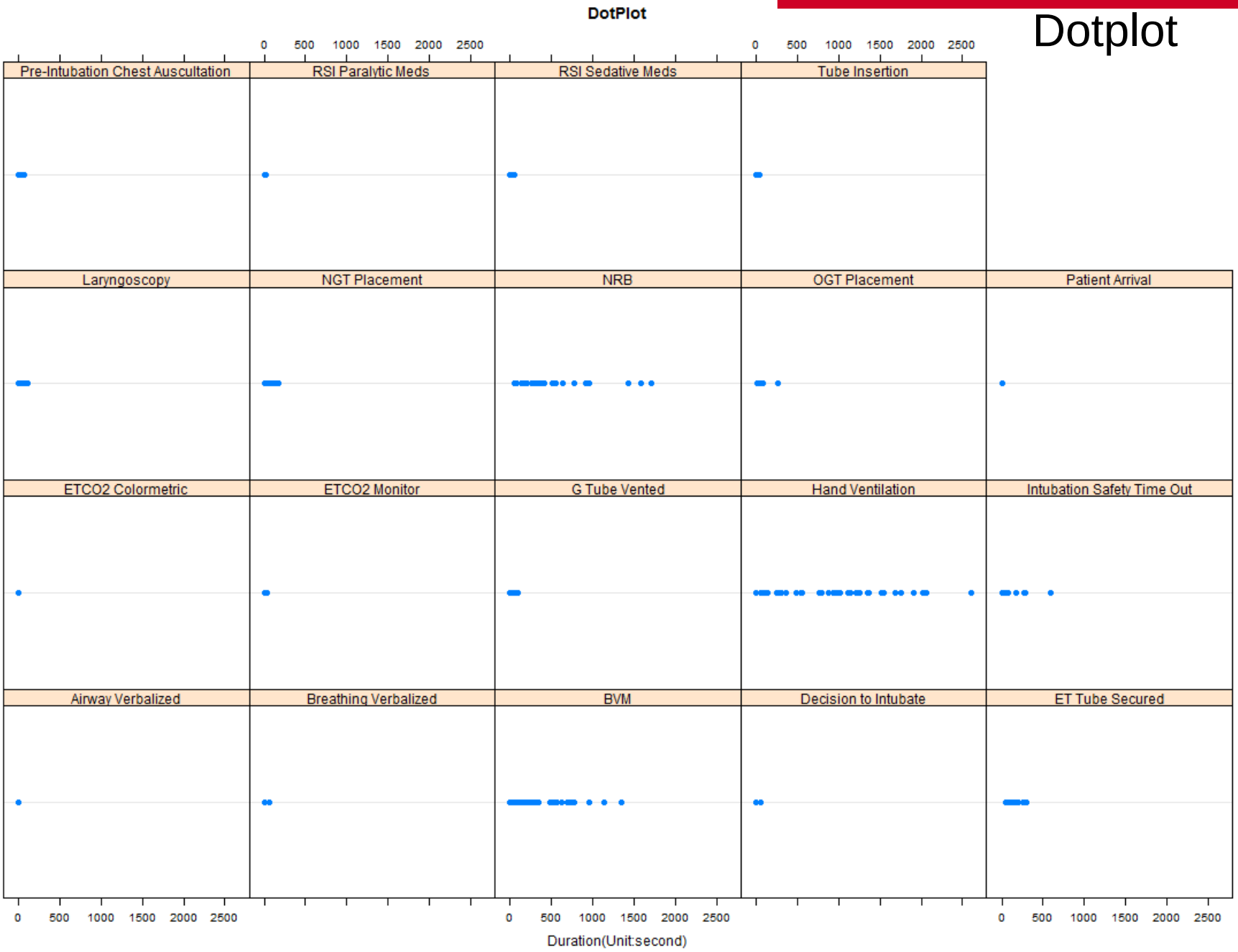
	A	B	C
1	Case ID	Activity	Occurrence
2	140828	R otoscop	3
3	140828	L otoscop	0
4	140828	Visual as	1
5	140828	L Visual	1
6	140828	R visual	1
7	140828	T-spine-I	0
8	140828	Visual in	1
9	140828	Log roll-	0
10	140828	Visual in	1
11	140828	Visual in	2
12	140828	Visual in	0
13	140828	Visual in	2

R : A powerful data visualization tool

Mosaic plot



Dotplot


DotPlot
0 500 1000 1500 2000 2500
Pre-Intubation Chest Auscultation
RSI Paralytic Meds
RSI Sedative Meds
Tube Insertion
Laryngoscopy
NGT Placement
NRB
OGT Placement
Patient Arrival
ETCO2 Colormetric
ETCO2 Monitor
G Tube Vented
Hand Ventilation
Intubation Safety Time Out
Airway Verbalized
Breathing Verbalized
BVM
Decision to Intubate
ET Tube Secured
Duration(Unit:second)

Thank you!