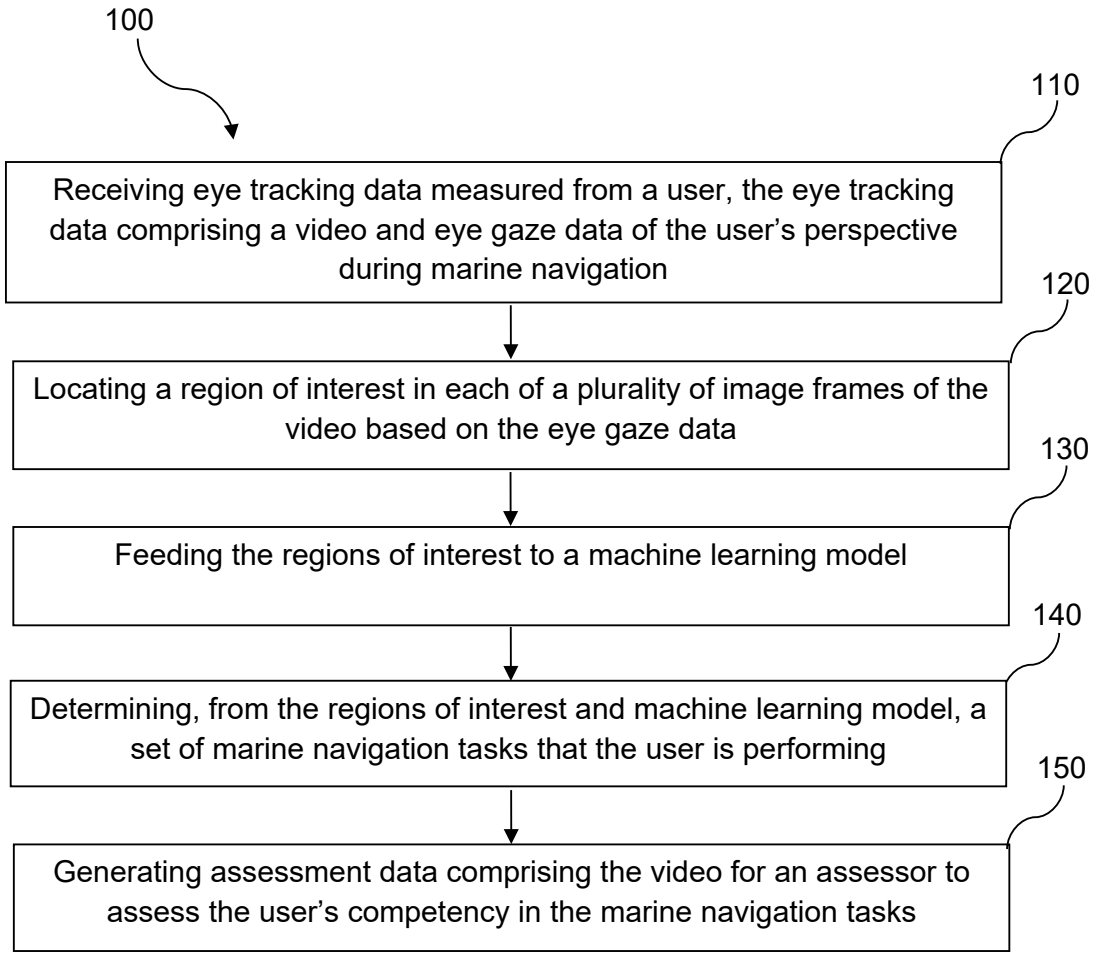


Figure 1

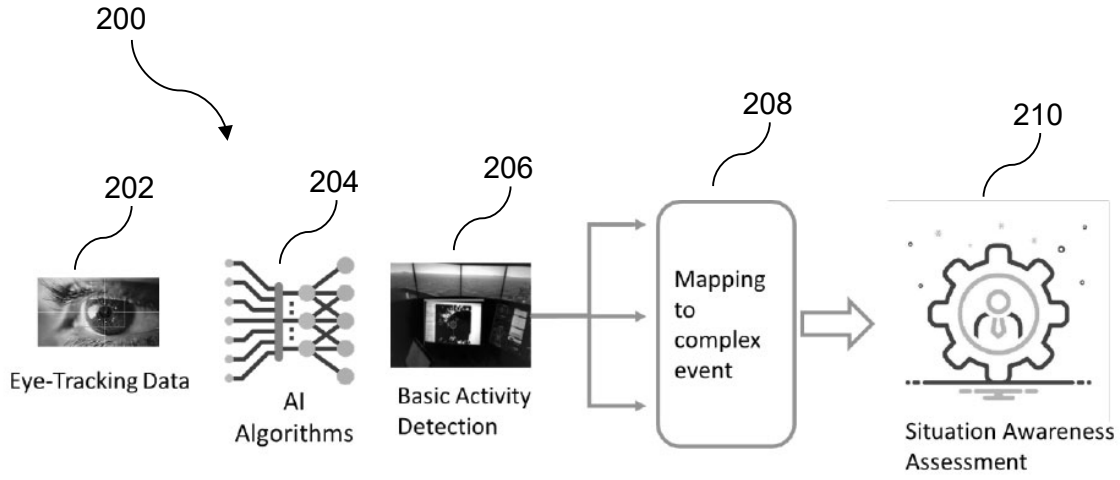


Figure 2

No.	Basic Marine Navigation Tasks
1	Use Radar
2	Use Engine Telegraph Video (Speed Change)
3	Visual Observation
4	Check Rate of Turn
5	Check GPS
6	Check Heading
7	Use ECDIS
8	Check Target Information
9	Check Speed
10	Use Echo Sounder

Figure 3A

No.	Complex Marine Navigation Tasks	Basic Marine Navigation Tasks
1	Monitor Own Ship and Other Ship Targets	3, 6, 7, (3,1), (1,7), (3,7)
2	Assess Closest Point of Approach	(3,1), (3,7), (3,7,1)
3	Collision Avoidance	2, (3,2), (1,2)
4	Check Equipment Functioning	1, 2, 5, 6, 7, 9
5	Assess Safe Waters	7, 10
6	Join Traffic Separation Scheme	7, 1
7	Wheel Over Point	(7,1), 1, 7

Figure 3B

Complex Task (1): Monitor Own Ship and Other Ship Targets		
Basic Tasks	**Minimum duration (seconds) for each basic task in this combination**	**Minimum duration (seconds) for all basic tasks in this combination**
Visual Observation (3)	4	4
Check Heading (6)	4	4
Use ECDIS (7)	4	4
Visual Observation (3), Use Radar (1)	3, 3	6
Use Radar (1), Use ECDIS (7)	3, 3	6
Visual Observation (3), Use ECDIS (7)	3, 3	6

Figure 3C

Complex Task (2): Assess Closest Point of Approach		
Basic Tasks	**Minimum duration (seconds) for each basic task in this combination**	**Minimum duration (seconds) for all basic tasks in this combination**
Visual Observation (3), Use Radar (1)	5, 5	10
Visual Observation (3), Use ECDIS (7)	5, 5	10
Visual Observation (3), Use ECDIS (7),Use Radar (1)	3, 3, 3	9

Figure 3D

Complex Task (3): Collision Avoidance		
Basic Tasks	**Minimum duration (seconds) for each basic task in this combination**	**Minimum duration (seconds) for all basic tasks in this combination**
Use Engine Telegraph Video (2)	8	8
Visual Observation (3), Use Engine Telegraph Video (2)	6, 6	12
Use Radar (1), Use Engine Telegraph Video (2)	6, 6	12

Figure 3E

Complex Task (4): Check Equipment Functioning		
Basic Tasks	**Minimum duration (seconds) for each basic task in this combination**	**Minimum duration (seconds) for all basic tasks in this combination**
Use Radar (1)	15	15
Use Engine Telegraph Video (2)	15	15
Check GPS (5)	15	15
Check Heading (6)	15	15
Use ECDIS (7)	15	15
Check Speed (9)	15	15

Figure 3F

Complex Task (5): Assess Safe Waters		
Basic Tasks	**Minimum duration (seconds) for each basic task in this combination**	**Minimum duration (seconds) for all basic tasks in this combination**
Use ECDIS (7)	4	4
Use Echo Sounder (10)	4	4

Figure 3G

Complex Task (6): Join Traffic Separation Scheme		
Basic Tasks	**Minimum duration (seconds) for each basic task in this combination**	**Minimum duration (seconds) for all basic tasks in this combination**
Use ECDIS (7)	6	6
Use Radar (1)	6	6

Figure 3H

Complex Task (7): Wheel Over Point		
Basic Tasks	**Minimum duration (seconds) for each basic task in this combination**	**Minimum duration (seconds) for all basic tasks in this combination**
Use ECDIS (7), Use Radar (1)	12, 12	24
Use Rader (1)	20	20
Use ECDIS (7)	20	20

Figure 3I

#	Start time	End time	Duration	Text
1	00:00:01.112	00:00:02.912	1.800	edis
2	00:00:31.192	00:00:34.660	3.468	edis
3	00:00:43.312	00:00:50.972	7.660	radar
4	00:01:07.753	00:01:10.377	2.624	edis
5	00:01:33.613	00:01:47.375	13.762	edis
6	00:02:02.592	00:02:40.025	37.433	radar
7	00:03:00.432	00:03:13.783	13.351	radar
8	00:03:18.392	00:03:20.548	2.156	radar
9	00:03:32.392	00:03:37.724	5.332	radar
10	00:04:01.952	00:04:04.186	2.234	radar
11	00:04:15.068	00:04:18.345	3.277	radar
12	00:04:37.592	00:04:40.263	2.671	radar
13	00:05:28.748	00:05:36.221	7.473	edis
14	00:05:38.752	00:05:38.872	0.120	hud
15	00:05:42.966	00:05:46.255	3.289	hud
16	00:08:13.596	00:08:16.200	2.604	edis
17	00:08:18.574	00:08:24.247	5.673	edis

Figure 3J

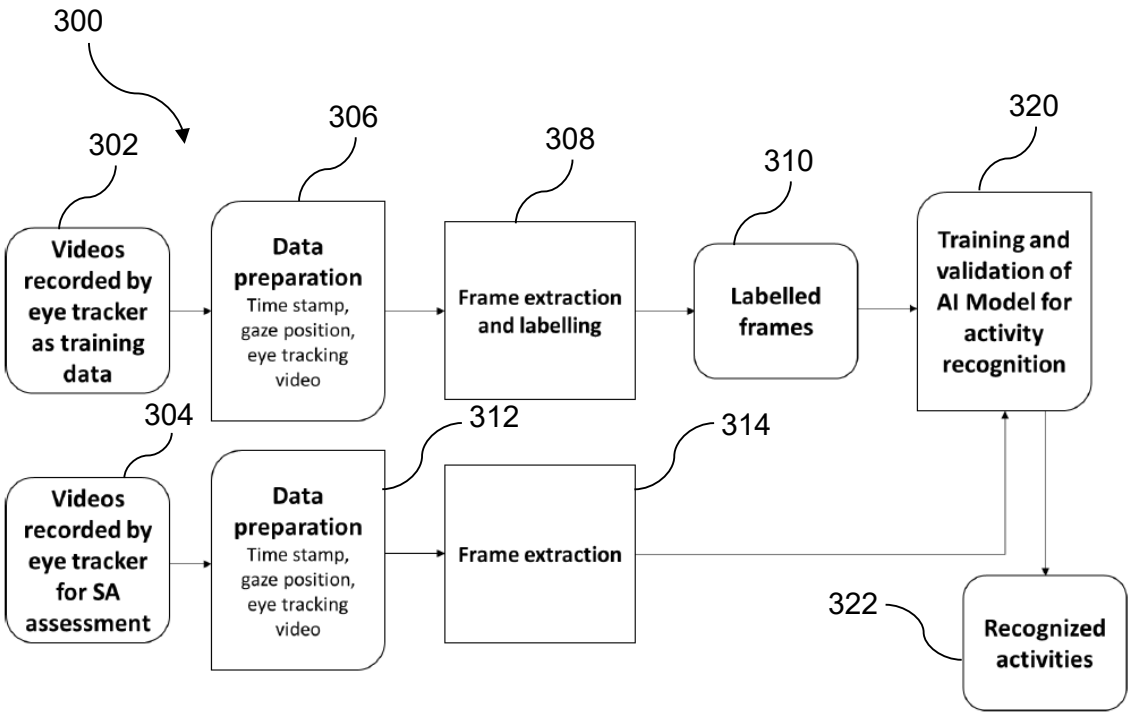


Figure 4



Figure 5A

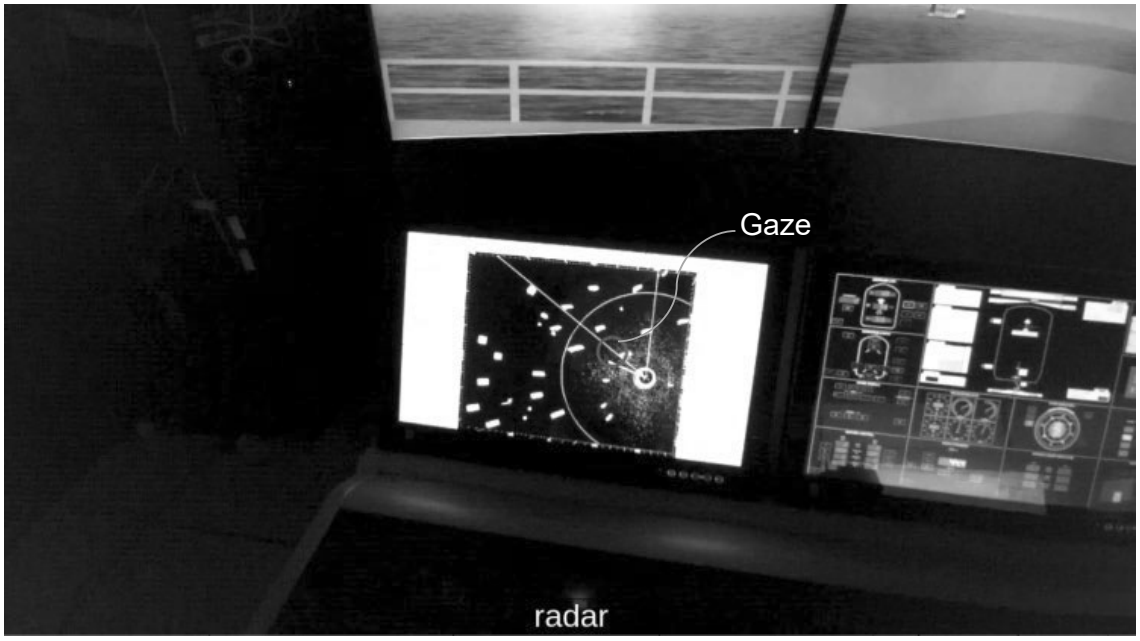


Figure 5B



Figure 5C

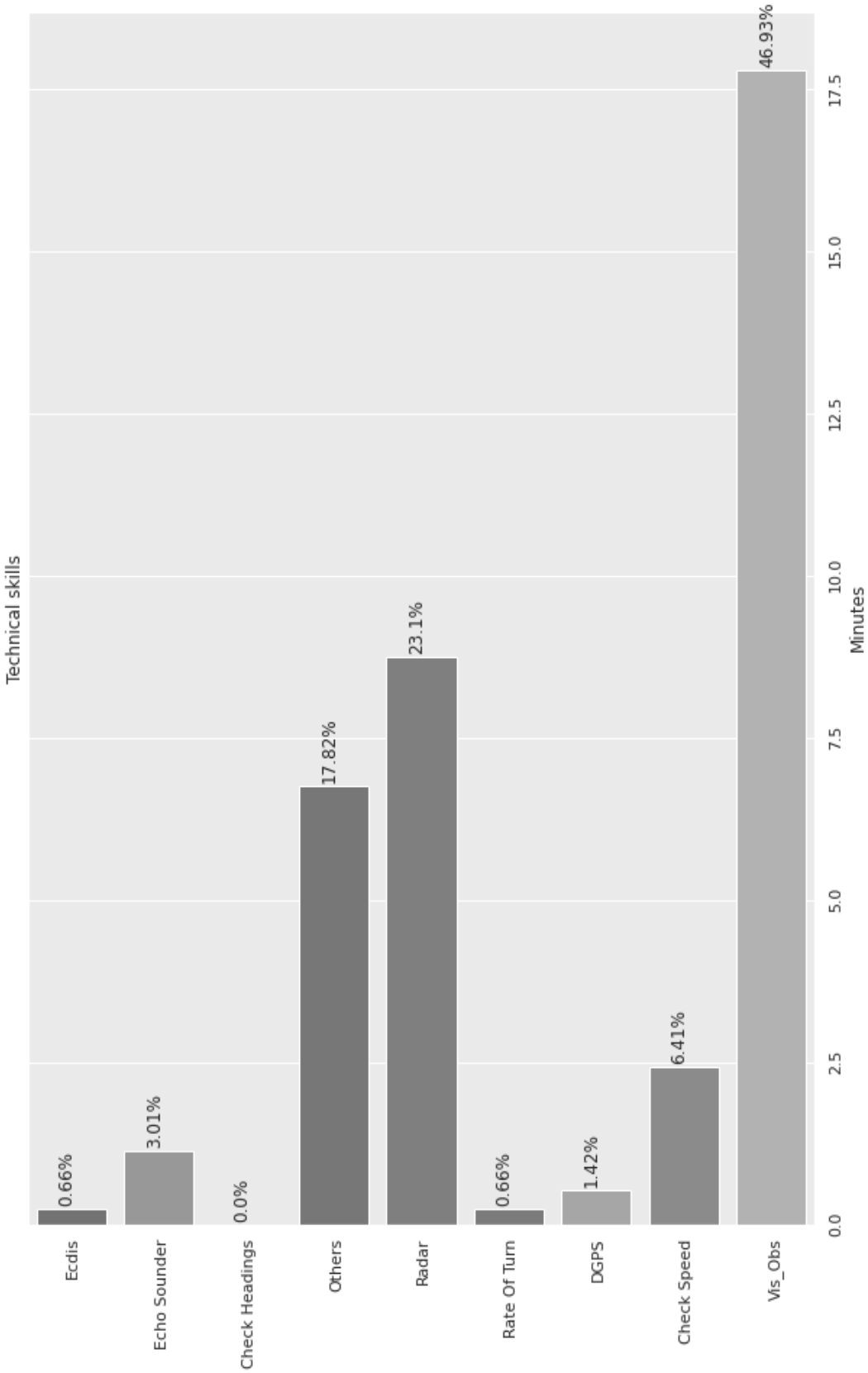

Technical skills
Ecdis
Echo Sounder
Check Headings
Others
Radar
Rate Of Turn
DGPS
Check Speed
Vis_Obs
0.66%
3.01%
0.0%
17.82%
23.1%
0.66%
1.42%
6.41%
46.93%
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
Minutes

Figure 6A

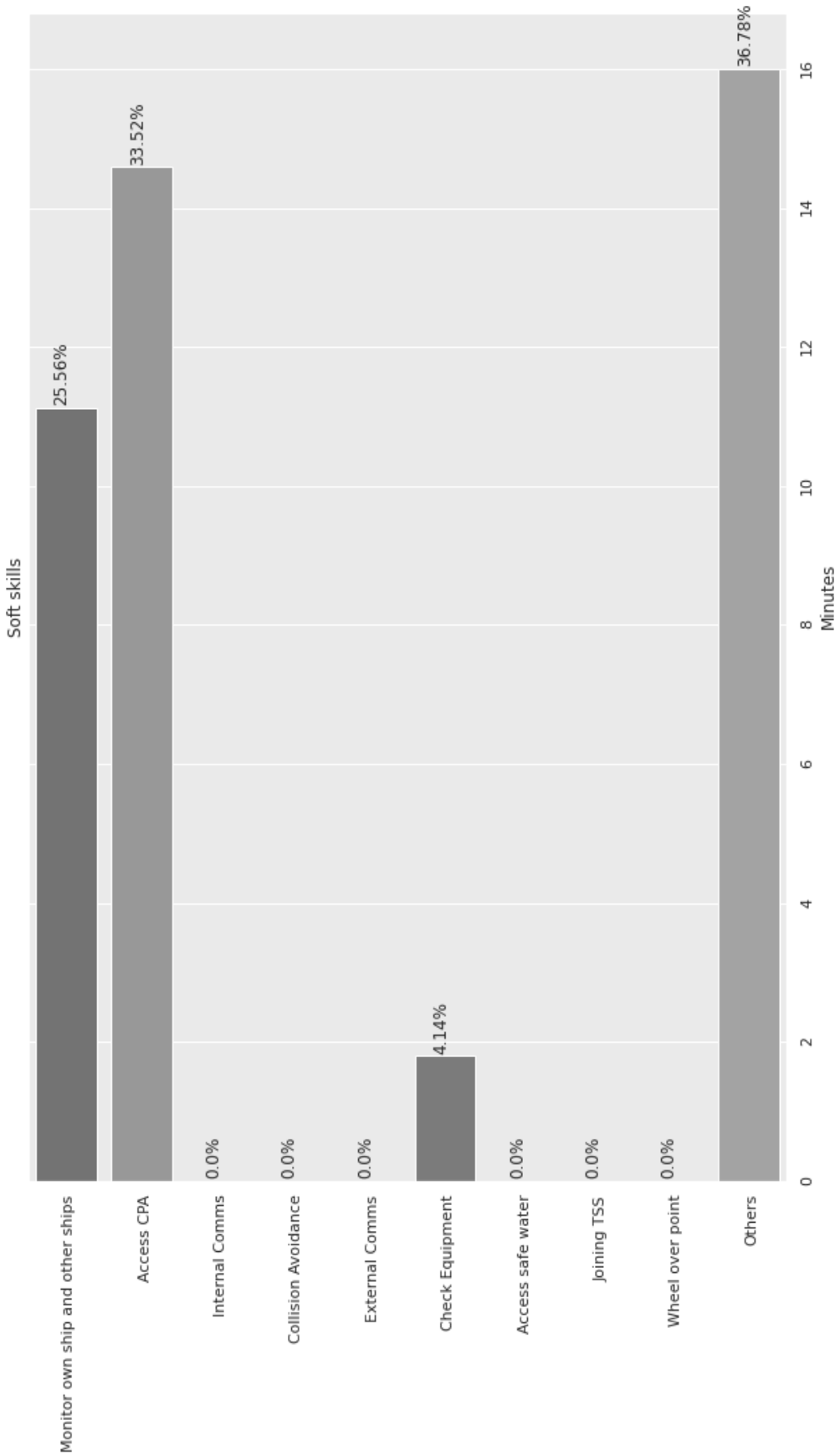

Soft skills
Minutes
0
2
4
6
8
10
12
14
16
25.56%
33.52%
0.0%
0.0%
0.0%
4.14%
0.0%
0.0%
0.0%
36.78%
Monitor own ship and other ships
Access CPA
Internal Comms
Collision Avoidance
External Comms
Check Equipment
Access safe water
Joining TSS
Wheel over point
Others

Figure 6B

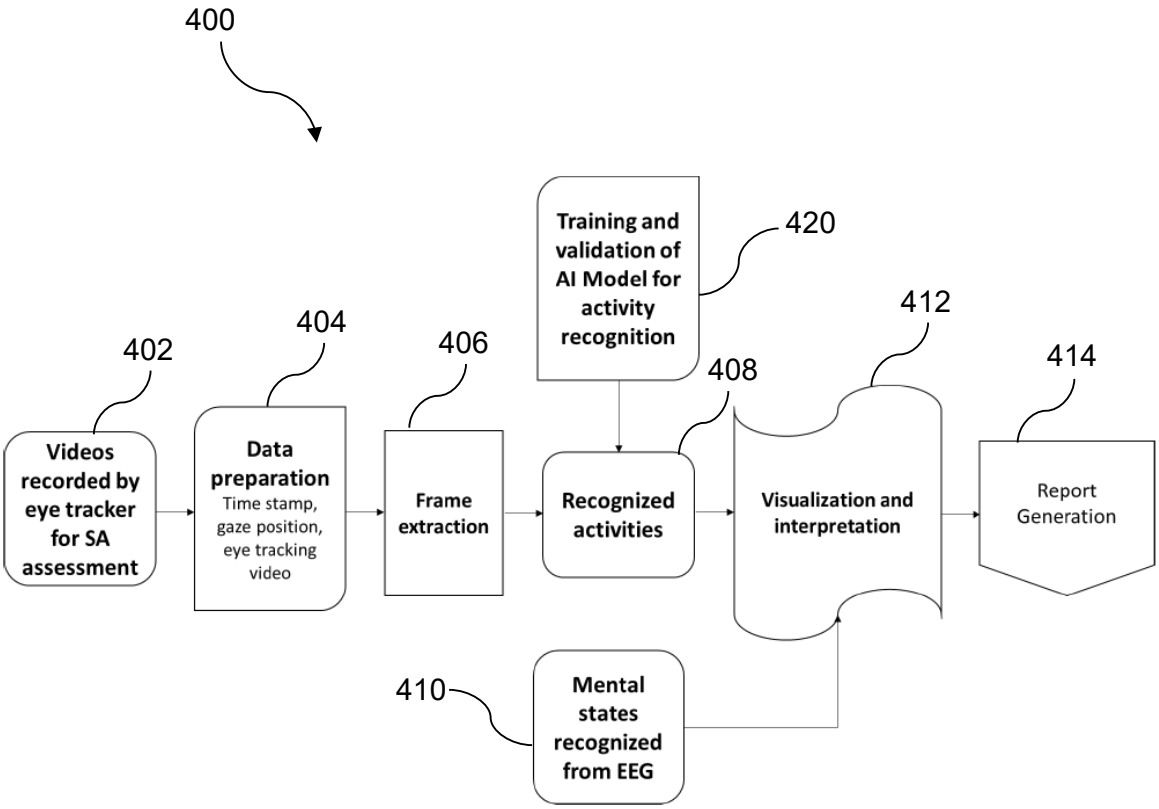

400
Training and validation of AI Model for activity recognition
420
412
402
404
406
408
414
Videos recorded by eye tracker for SA assessment
Data preparation
Time stamp, gaze position, eye tracking video
Frame extraction
Recognized activities
Visualization and interpretation
Report Generation
410
Mental states recognized from EEG

Figure 7

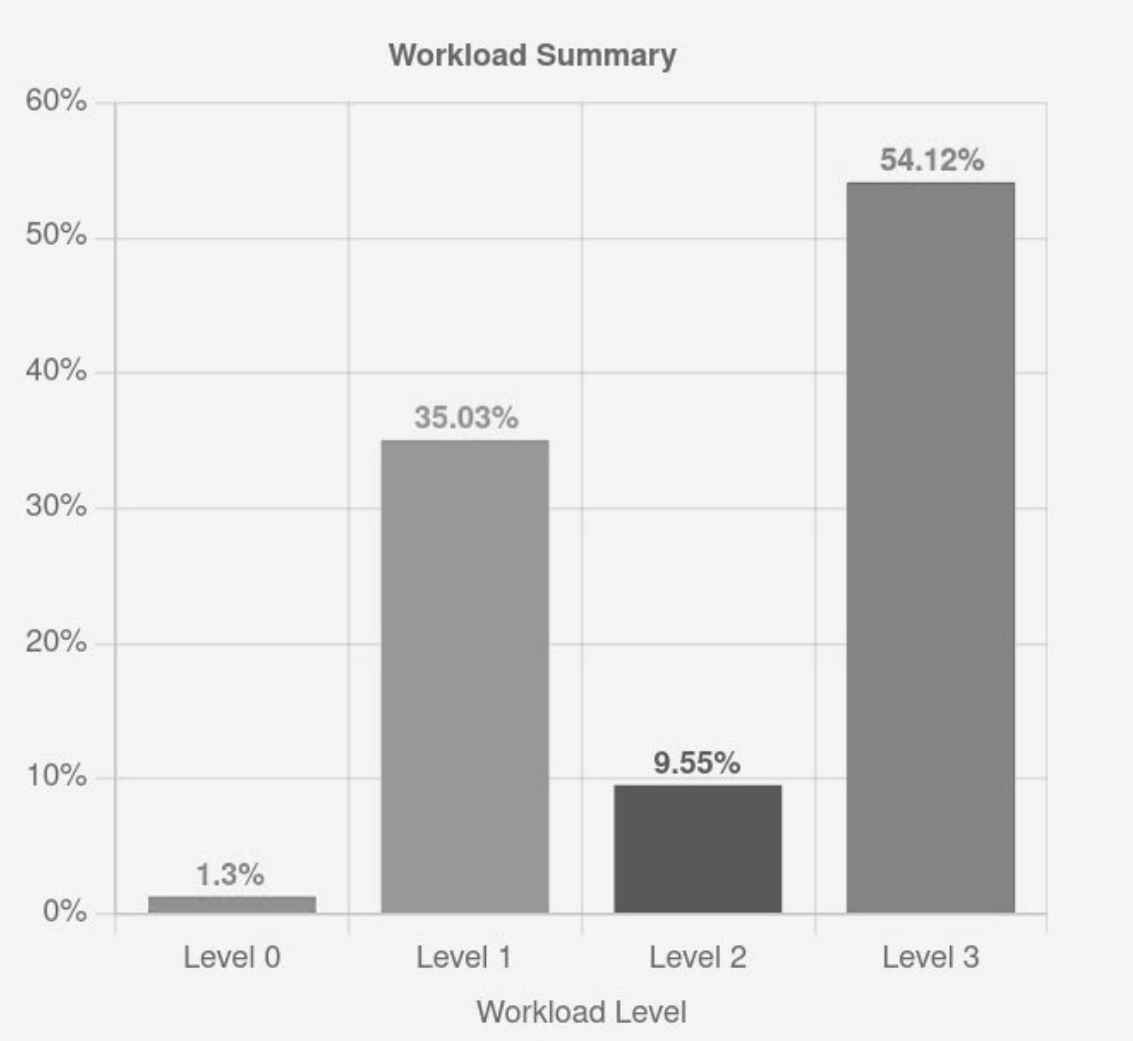

Workload Summary
60%
50%
40%
30%
20%
10%
0%
1.3%
35.03%
9.55%
54.12%
Level 0
Level 1
Level 2
Level 3
Workload Level

Figure 8A

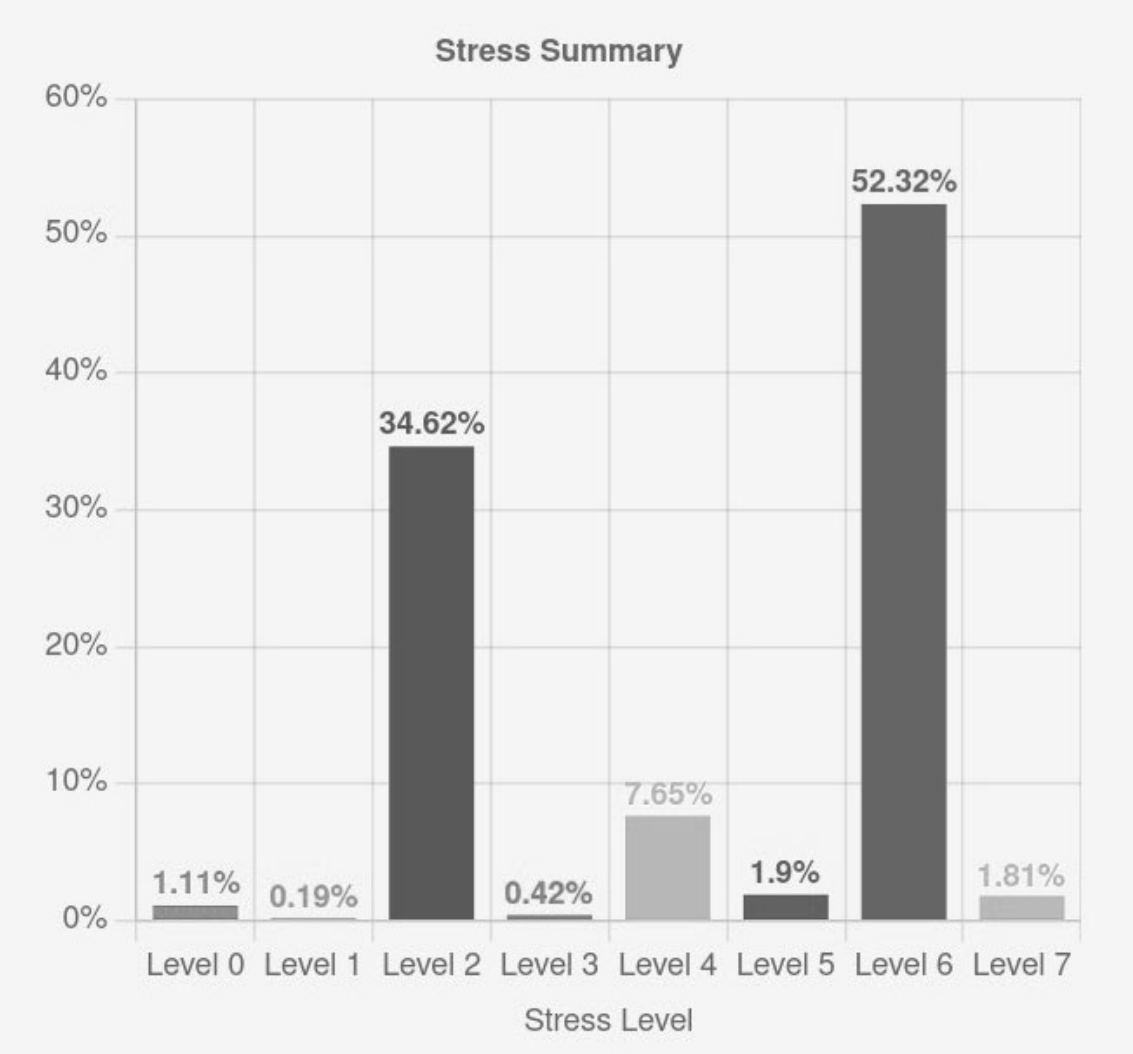

Stress Summary
60%
50%
40%
30%
20%
10%
0%
1.11%
0.19%
34.62%
0.42%
7.65%
1.9%
52.32%
1.81%
Level 0
Level 1
Level 2
Level 3
Level 4
Level 5
Level 6
Level 7
Stress Level

Figure 8B

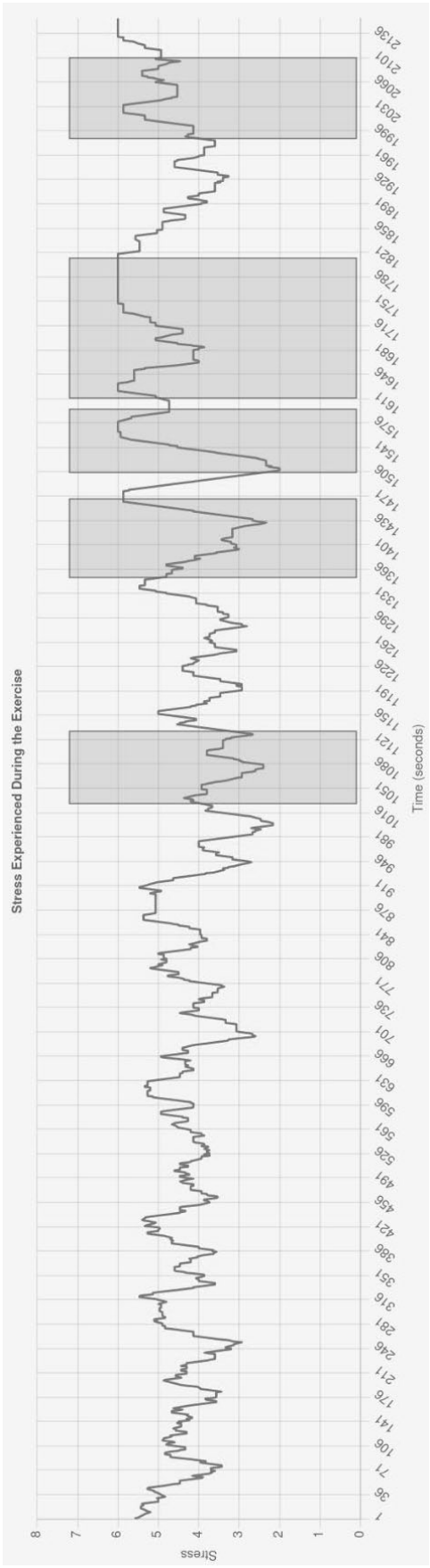

Stress Experienced During the Exercise
Stress
Time (seconds)
0
1
2
3
4
5
6
7
8
1
36
71
106
141
176
211
246
281
316
351
386
421
456
491
526
561
596
631
666
701
736
771
806
841
876
911
946
981
1016
1051
1086
1121
1156
1191
1226
1261
1296
1331
1366
1401
1436
1471
1506
1541
1576
1611
1646
1681
1716
1751
1786
1821
1856
1891
1926
1961
1996
2031
2066
2101
2136

Figure 8C