RESULTS

1. AtzoriNet

AtzoriNet For Window Evaluation				
Subject	Accuracy (%)	Test Loss	Top 3 Accuracy (%)	Top 5 Accuracy (%)
1	84.23	0.7381	94.02	96.5
2	83.06	0.7804	96.09	97.76
3	81.29	0.8605	92.54	95.41
4	79.31	0.8577	93.94	96.52
5	80.94	0.6939	95.18	96.91
6	81.29	0.8433	94.27	96.11
7	81.86	0.7685	95.06	97.69
8	89.01	0.4978	96.88	98.19
9	85.02	0.6179	95.51	97.51
10	86.78	0.5208	97.19	98.55
11	84.78	0.8295	93.5	95.61
12	84.73	0.6591	95.46	97.72
13	79.39	0.9323	91.79	94.87
14	84.75	0.6161	95.69	97.51
15	82.92	0.7298	94.3	96.37
16	75.69	1.1625	89.01	92.21
17	87.25	0.558	95.77	97.82
18	76.5	1.1173	90.84	94.33
19	84.26	0.6483	94.47	96.39
20	90.29	0.4573	98.03	98.88
21	91.24	0.4175	98.15	99.03
22	92.14	0.3307	98.81	99.6
23	80.34	0.8435	93.25	96.58
24	87.84	0.4991	97.41	98.36
25	87.35	0.5003	96.88	98.55
26	88.15	0.5397	96.6	97.6
27	74.81	1.046	91.42	94.99
Average	83.90$\pm$4.49	0.7061$\pm$0.2086	94.89$\pm$2.34	96.95$\pm$1.39

Confusion Matrix

AtzoriNet With Majority Voting				
Subject	Accuracy (%)	Test Loss	Top 3 Accuracy (%)	Top 5 Accuracy (%)
1	90.38	0.6676	96.79	99.36
2	89.74	0.7019	96.79	98.08
3	87.82	0.7824	97.44	98.08
4	87.18	0.7635	99.36	100
5	90.38	0.6114	99.36	99.36
6	86.54	0.7617	97.44	98.72
7	85.26	0.6923	96.79	99.36
8	95.51	0.4149	98.72	100
9	90.38	0.5481	99.36	99.36
10	92.31	0.4421	99.36	100
11	91.03	0.7539	95.51	96.79
12	91.67	0.5883	98.72	99.36
13	85.9	0.8525	94.87	95.51
14	93.59	0.5451	98.08	100
15	90.38	0.6596	98.72	99.36
16	82.05	1.0763	91.67	94.87
17	92.95	0.481	98.72	100
18	80.77	1.0445	93.59	97.44
19	89.74	0.567	96.79	98.08
20	94.87	0.3715	99.36	100
21	94.23	0.3438	100	100
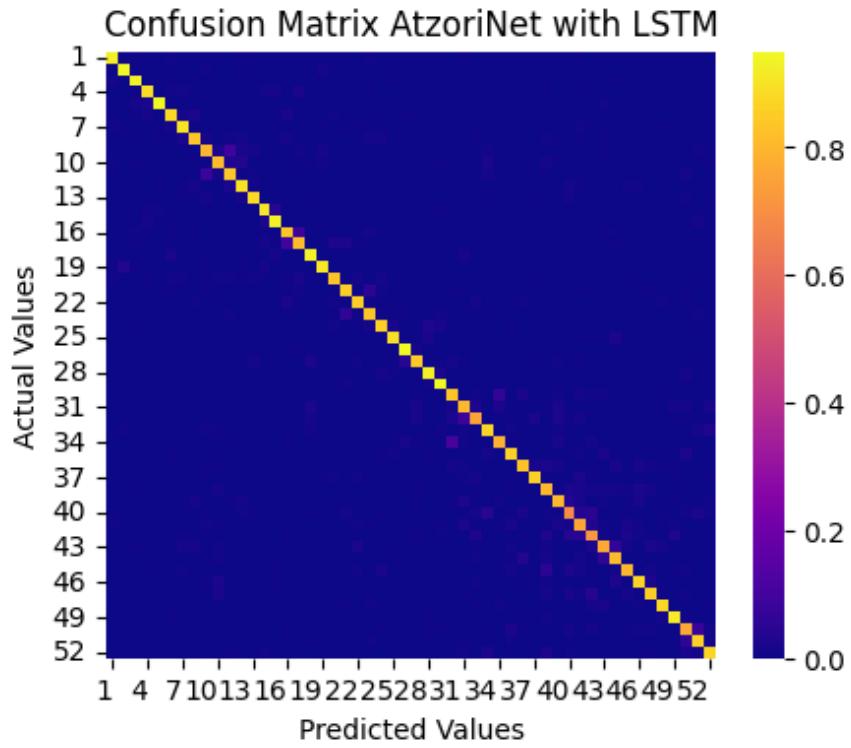
22	94.23	0.2615	99.36	100
23	88.46	0.7693	97.44	98.72
24	93.59	0.4198	99.36	99.36
25	89.1	0.4199	100	100
26	90.38	0.4669	98.08	98.72
27	81.41	0.96	94.23	96.15
Average	89.62±3.94	0.6284±0.2070	97.63±2.07	98.77±1.44

Πίνακας **Error! No text of specified style in document.**-1 Αποτελέσματα AtzoriNet για ολόκληρες τις κινήσεις

2.   Experiment 1

AtzoriNet with LSTM (Experiment 1) For Window Evaluation			
Subject	Accuracy (%)	Test Loss	Top 3 Accuracy (%)	Top 5 Accuracy (%)
1	85.95	0.8071	95.01	97.17
2	84.62	0.8136	94.94	96.95
3	84.07	0.9491	94.01	95.77
4	79.84	0.9368	93.75	96.1
5	82.92	0.8337	94.63	97.12
6	83.45	0.9257	92.75	95.2
7	83.39	0.7637	95.88	97.82
8	90.14	0.5332	97.01	98.17
9	86.85	0.6658	97.2	98.26
10	88.32	0.6866	96.34	97.72
11	86.56	0.8555	94.68	96.15
12	85.92	0.8133	95.16	97.15
13	80.89	1.027	92.23	95.3
14	86.95	0.6676	95.58	97.44
15	83.05	0.9153	92.74	96.23
16	77.11	1.2863	89.58	93
17	87.84	0.6322	95.44	97.27
18	77.59	1.3012	90.29	93.89
19	85.13	0.8006	94.47	96.25
20	91.71	0.4612	97.93	99.05
21	91.98	0.3876	98.05	99.1
22	93.14	0.3377	99.34	99.6
23	81.74	0.9451	93.73	96.34
24	89.81	0.5635	97.67	98.5
25	88.51	0.6099	96.56	98.03
26	90.67	0.525	97.39	98.15
27	76.57	1.316	90.91	94.33
Average	85.36±4.46	0.7911±0.2520	94.94±2.39	96.89±1.58

Confusion Matrix AtzoriNet with LSTM
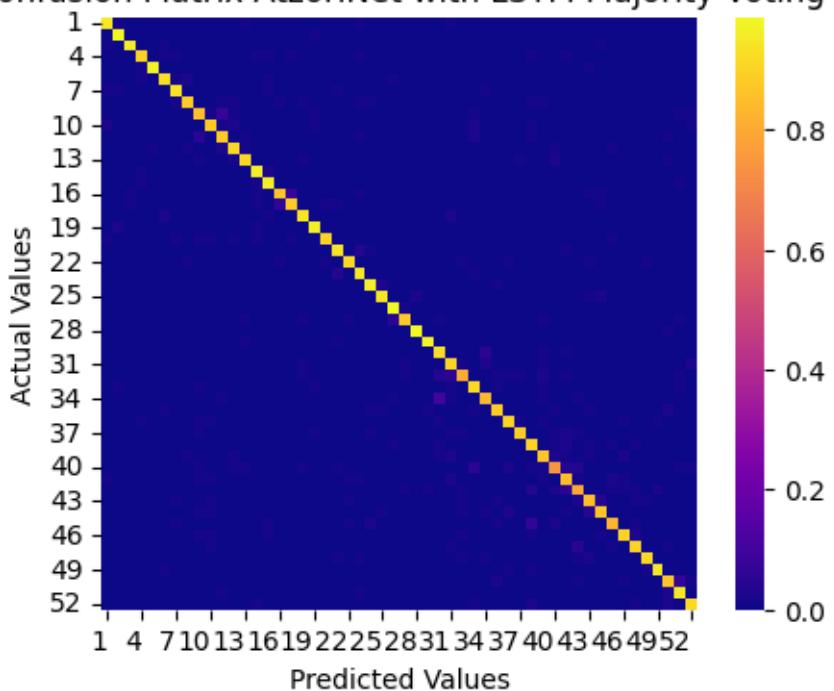
AtzoriNet with LSTM (Experiment 1) Majority Voting				
Subject	Accuracy (%)	Test Loss	Top 3 Accuracy (%)	Top 5 Accuracy (%)
1	91.67	0.6681	99.36	100
2	89.74	0.6864	96.15	97.44
3	90.38	0.8574	97.44	98.72
4	88.46	0.8236	99.36	100
5	88.46	0.7824	98.72	99.36
6	91.03	0.7832	97.44	98.08
7	87.82	0.7637	98.08	99.39
8	95.51	0.3868	98.72	99.36
9	91.03	0.5539	99.36	100
10	92.95	0.5799	99.36	99.36
11	90.38	0.7166	96.15	97.44
12	91.67	0.6945	98.72	99.36
13	85.9	0.8865	94.87	97.44
14	92.95	0.5158	98.72	99.36
15	89.1	0.7695	98.08	100
16	84.62	1.148	91.67	94.23
17	90.83	0.519	96.15	98.08
18	83.33	1.2032	94.23	96.15
19	92.95	0.6469	97.44	99.36
20	96.15	0.391	100	100
21	96.79	0.306	100	100

22	96.79	0.2453	100	100
23	87.18	0.8718	98.08	99.36
24	96.15	0.4781	99.36	100
25	91.03	0.5174	98.72	100
26	94.87	0.449	98.08	99.36
27	80.13	1.1636	94.23	97.44
Average	90.66$\pm$4.09	0.6818$\pm$0.243	97.72$\pm$2.03	98.86$\pm$1.39

Πίνακας **Error! No text of specified style in document.**-2 Αποτελέσματα AtzoriNet με LSTM για ολόκληρες τις κινήσεις
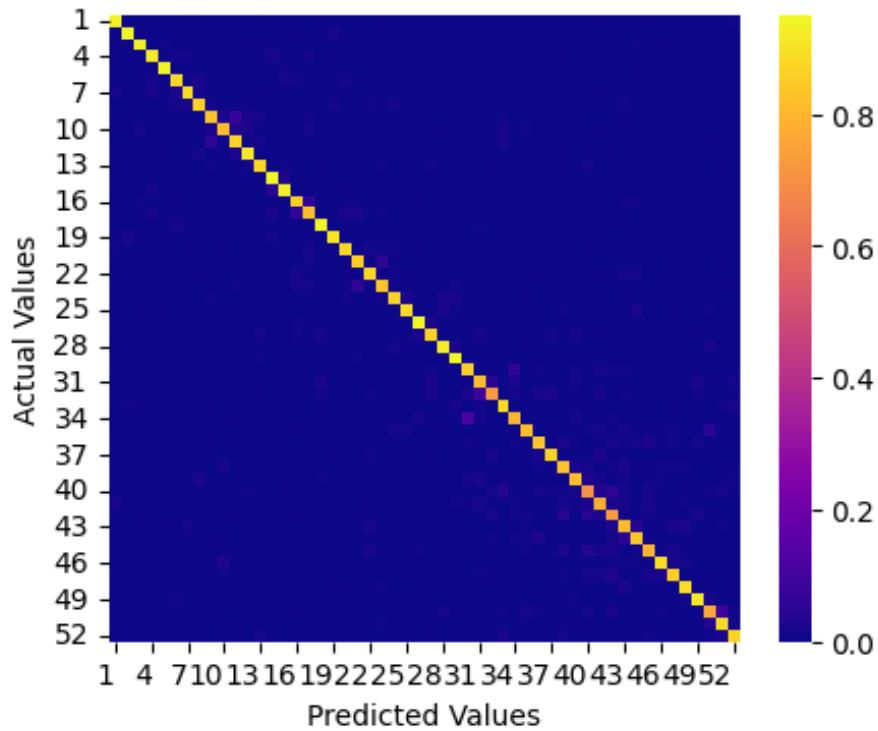
# 3. Experiment 2

| AtzoriNet with Bidirectional LSTM (Experiment 2) For Window Evaluation				
Subject	Accuracy (%)	Test Loss	Top 3 Accuracy (%)	Top 5 Accuracy (%)
1	86.82	0.6301	96.53	98.72
2	86.01	0.7383	96.21	98.2
3	83.9	0.8896	92.94	95.41
4	81.347	0.8445	94.94	96.8
5	85.01	0.7122	95.72	97.51
6	84.37	0.9021	94.59	96.2
7	84.82	0.8045	96.75	98.23
8	90.45	0.5221	97.03	97.98
9	87.23	0.6735	96.08	97.74
10	88.03	0.6466	96.06	98.01
11	87.13	0.7796	94.21	95.44
12	86.68	0.6978	95.58	97.25
13	80.76	1.077	92.26	95.53
14	88.44	0.5533	96.84	97.63
15	84.24	0.8458	94.18	97.18
16	77.78	1.2919	90.5	92.9
17	87.96	0.518	95.7	97.17
18	78.3	1.1631	91.14	94.4
19	86.06	0.7304	94.94	96.18
20	92.92	0.3517	98.6	99.12
21	93.3	0.3252	98.5	99.12
22	94.37	0.2464	99.12	99.64
23	81.74	0.8604	93.38	96.84
24	90.01	0.4881	98.2	99.22
25	90.26	0.4761	96.89	98.29
26	91.14	0.4792	97.69	98.6
27	76.59	1.2018	90.55	95.44
Average	86.13±4.57	0.7203±0.2595	95.38±2.34	97.21±1.58
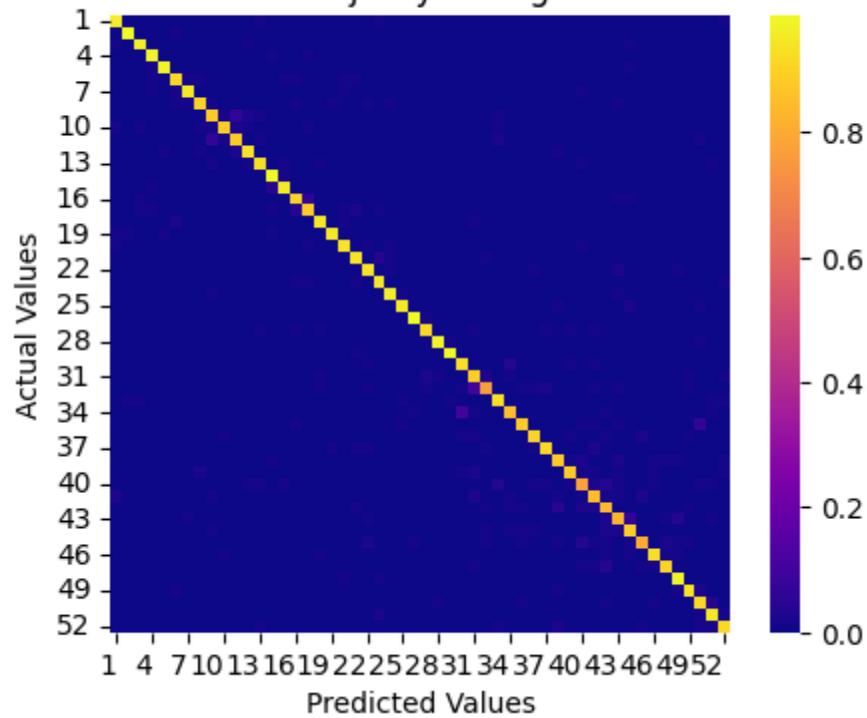
Confusion Matrix AtzoriNet with Bidirectional LSTM

AtzoriNet with Bidirectional LSTM (Experiment 2) Majority Voting				
Subject	Accuracy (%)	Test Loss	Top 3 Accuracy (%)	Top 5 Accuracy (%)
1	94.87	0.5271	99.36	99.36
2	92.95	0.6315	98.72	99.36
3	89.74	0.781	96.79	98.72
4	89.1	0.7295	98.08	99.36
5	91.67	0.6275	98.72	99.36
6	88.46	0.8388	98.72	98.72
7	88.46	0.7273	99.36	99.36
8	95.51	0.4141	98.72	98.72
9	93.59	0.579	98.08	99.36
10	91.03	0.5842	100	100
11	91.67	0.6598	96.15	97.44
12	93.59	0.6236	99.36	99.36
13	85.9	0.9725	93.89	98.08
14	94.87	0.4825	99.36	100
15	91.67	0.7495	98.72	98.72
16	83.97	1.177	93.59	94.87
17	92.95	0.518	97.44	99.36
18	83.33	1.0947	94.87	97.44
19	91.03	0.6512	98.08	98.08
20	96.79	0.3162	99.36	100

|				
21	97.44	0.2826	100	100
22	96.15	0.1987	100	100
23	88.46	0.7484	97.44	98.72
24	96.15	0.4076	100	100
25	93.59	0.429	98.72	99.36
26	94.87	0.3963	98.72	99.36
27	82.69	1.0815	94.87	98.72
Average	91.50 ±4.05	0.6381±0.2431	98.04±1.83	98.96±1.08
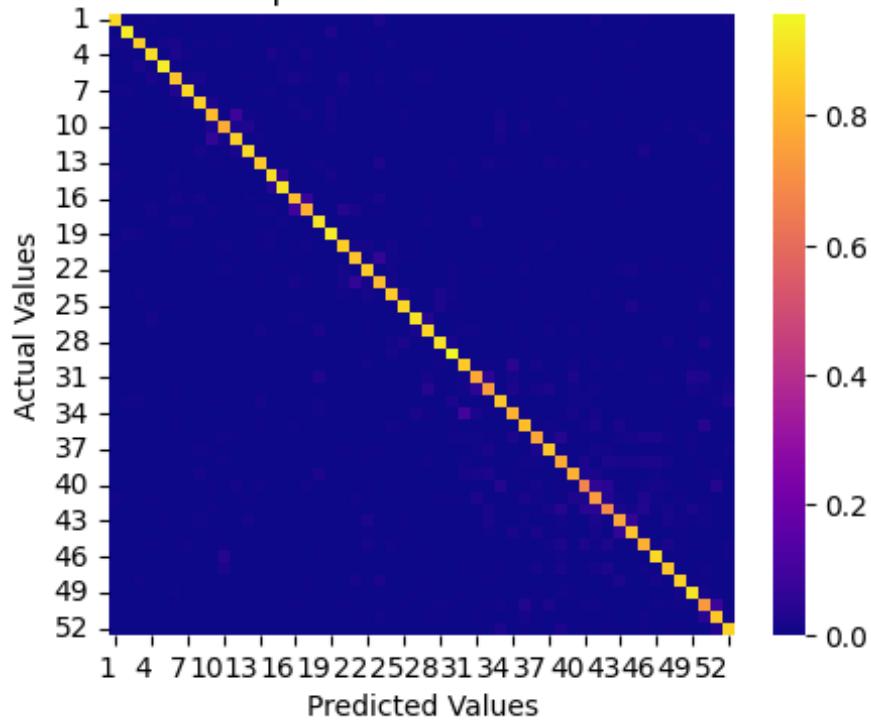
Confusion Matrix AtzoriNet with Bidirectional LSTM Majority Voting

4. Experiment 3

| Time-Distributed Input 3X5X10 with LSTM (Experiment 3) For Window Evaluation				
Subject	Accuracy (%)	Test Loss	Top 3 Accuracy (%)	Top 5 Accuracy (%)
1	84.68	0.8021	95.48	97.07
2	83.26	0.8077	94.75	97.65
3	82.5	0.9738	92.99	95.36
4	80.53	0.8716	94.63	97.39
5	81.29	0.8991	93.52	95.75
6	81.15	0.9167	92.26	94.39
7	82.73	0.8651	96.15	97.84
8	85.73	0.6605	97.03	98.17
9	84.28	0.8624	94.49	97.15
10	84.81	0.7924	95.66	97.34
11	85.42	0.8087	95.37	96.6
12	85.23	0.8213	95.25	97.06
13	78.08	1.053	92.33	95.44
14	85.9	0.7586	94.28	96.6
15	81.05	0.9857	93.59	96.46
16	76.35	1.2831	88.91	92.07
17	87.39	0.6617	96.79	98.22
18	76.99	1.2736	89.7	93.11
19	85.04	0.8322	93.64	95.73
20	89.86	0.5682	97.01	97.82
21	92.23	0.5162	98.01	98.43
22	93.2	0.3847	98.58	99.48
23	81.36	0.09399	92.85	96.96
24	86.99	0.6686	97.51	98.58
25	90.03	0.5401	96.75	98.2
26	90.53	0.5293	97.15	98.17
27	74.95	1.1488	89.38	93.3
Average	84.13±4.60	0.7918±0.2545	94.59±2.52	96.68±1.77
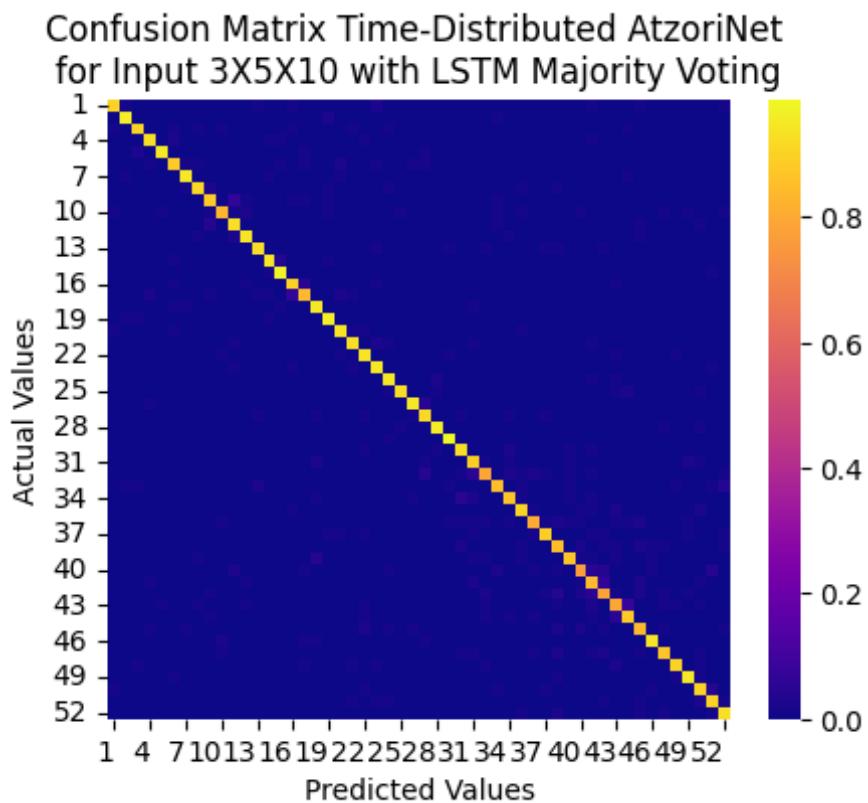
Confusion Matrix Time-Distributed AtzoriNet for Input 3X5X10 with LSTM

Time-Distributed Input 3X5X10 with LSTM (Experiment 3) Majority Voting				
Subject	Accuracy (%)	Test Loss	Top 3 Accuracy (%)	Top 5 Accuracy (%)
1	92.31	0.689	97.44	99.36
2	89.74	0.6144	96.15	98.08
3	89.74	0.821	98.08	99.36
4	89.1	0.6841	98.72	99.36
5	88.46	0.7153	97.44	97.44
6	87.18	0.7345	96.79	97.44
7	87.18	0.7528	98.09	98.72
8	89.74	0.4769	99.39	99.36
9	87.82	0.7182	98.08	99.36
10	89.74	0.6264	98.08	99.36
11	90.38	0.7182	96.79	98.08
12	91.67	0.7112	98.08	99.36
13	85.9	0.8616	94.87	96.15
14	94.23	0.5711	94.28	96.6
15	87.18	0.8401	98.72	98.72
16	81.41	1.0895	92.95	94.87
17	94.87	0.517	100	100
18	82.69	1.0918	96.15	97.44
19	91.67	0.6783	98.08	98.72

| 20	93.59	0.4657	100	100
21	95.51	0.4228	98.08	98.72
22	98.08	0.269	100	100
23	88.46	0.7513	98.72	100
24	92.95	0.5122	99.36	99.36
25	93.59	0.4983	98.72	99.36
26	94.23	0.4328	98.72	98.72
27	80.77	0.9576	95.51	96.79
Average	89.93 $\pm$4.15	0.6749$\pm$0.1925	97.68$\pm$1.74	98.54$\pm$1.29
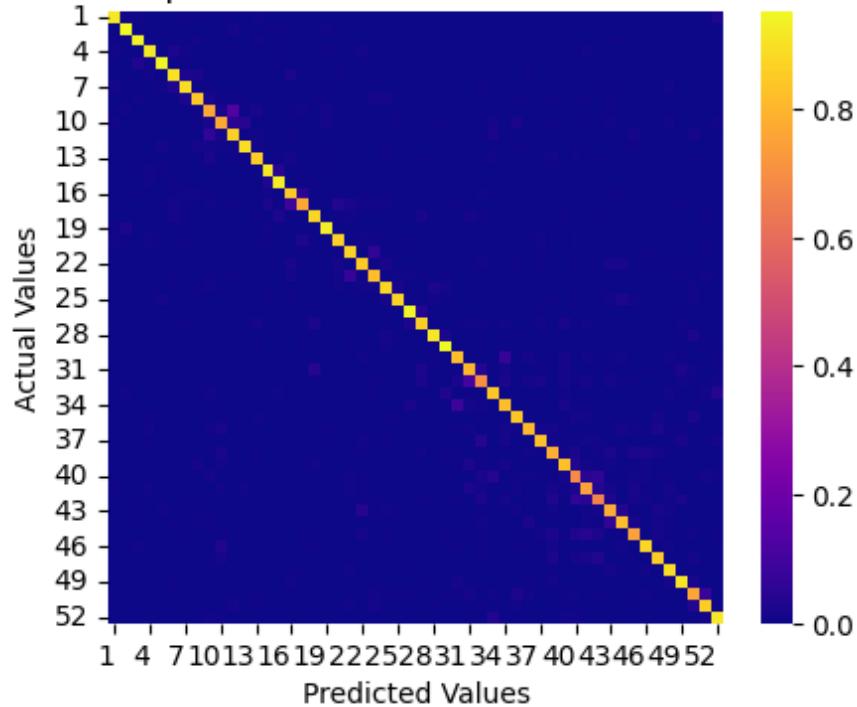
Πίνακας **Error! No text of specified style in document.**-3 Αποτελέσματα Time-Distributed AtzoriNet για είσοδο 3X5X10 με LSTM για ολόκληρε τις κινήσεις

5. Experiment 4

Time-Distributed Input 3X5X10 with Bidirectional LSTM (Experiment 4) For Window Evaluation				
Subject	Accuracy (%)	Test Loss	Top 3 Accuracy (%)	Top 5 Accuracy (%)
1	85.19	0.8431	95.11	96.89
2	84.02	0.8612	95.54	97.7
3	82.38	1.0611	92.45	94.64
4	82.24	0.8256	94.72	97.6
5	82.41	0.9541	93.99	95.85
6	82.67	1.0018	92.52	95.25
7	82.93	0.9457	94.39	97.05
8	88.98	0.5535	96.34	98.19
9	85.07	0.7542	96.01	98.03
10	85.16	0.7868	95.13	97.36
11	86.61	0.8044	94.59	96.2
12	84.54	0.8309	94.8	97.41
13	80.11	1.119	91.83	94.54
14	86.94	0.7291	95.25	96.79
15	82.15	0.9211	93.87	96.03
16	77.68	1.3956	89.67	92.47
17	87.06	0.676	95.58	97.53
18	79.1	1.3353	90.72	92.62
19	85.16	0.8045	94.56	96.6
20	90.01	0.5422	97.2	98.46
21	91.41	0.4783	98.27	99.17
22	93.09	0.3221	99.07	99.53
23	82.35	1.001	93.73	96.89
24	85.66	0.6945	95.89	97.91
25	90.24	0.5397	97.67	98.46
26	90.78	0.5393	98.72	98.72
27	75.02	1.2594	91.43	95.62
Average	84.72±4.20	0.8363±0.2556	94.78±2.30	96.80±1.74

Confusion Matrix Time-Distributed AtzoriNet for Input 3X5X10 with Bidirectional LSTM
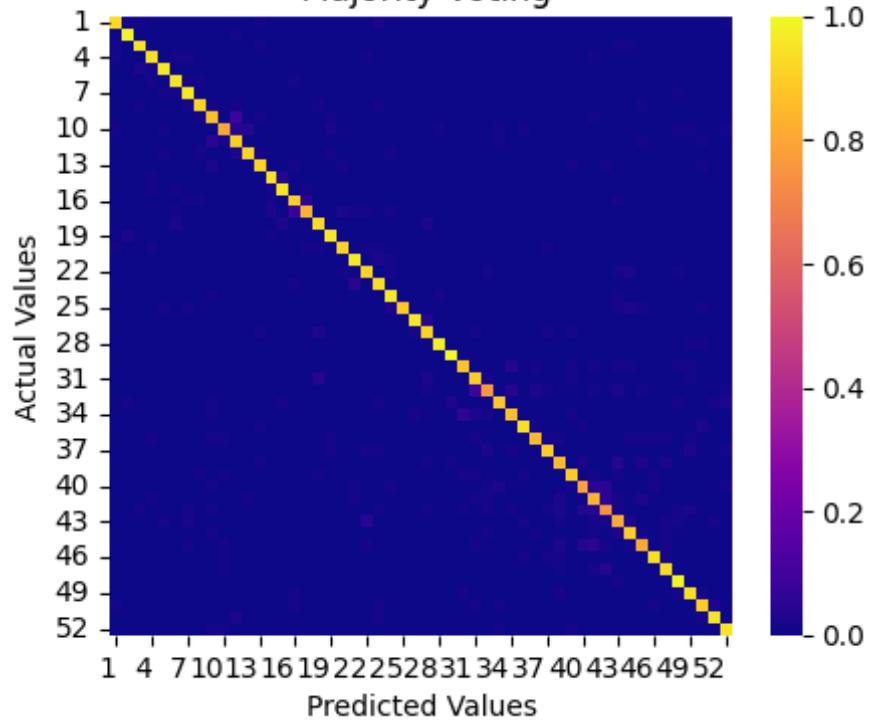
Time-Distributed Input 3X5X10 with Bidirectional LSTM (Experiment 4) Majority Voting				
Subject	Accuracy (%)	Test Loss	Top 3 Accuracy (%)	Top 5 Accuracy (%)
1	91.67	0.7288	97.44	99.36
2	91.67	0.7175	98.08	99.36
3	91.03	0.9702	97.44	98.08
4	91.67	0.7305	97.44	98.72
5	91.67	0.7869	97.44	98.08
6	89.74	0.9129	94.87	96.79
7	85.9	0.8656	97.44	98.72
8	92.95	0.4584	98.08	100
9	87.82	0.6682	98.72	100
10	89.74	0.663	98.08	98.72
11	89.1	0.6918	96.79	97.44
12	92.31	0.7136	98.72	100
13	85.9	0.8225	94.87	96.15
14	92.95	0.5881	98.72	100
15	88.46	0.809	98.08	98.72
16	83.97	1.2312	94.23	94.23
17	92.95	0.5332	99.36	99.36
18	83.33	1.0978	95.51	96.79
19	92.95	0.6751	97.44	99.36

20	94.87	0.4379	99.36	100
21	96.15	0.4028	100	100
22	96.15	0.2403	100	100
23	90.38	0.7695	97.44	99.36
24	91.67	0.6134	100	100
25	93.59	0.4575	99.36	99.36
26	96.15	0.4193	98.72	98.72
27	81.41	0.9665	94.87	96.79
Average	90.60 $\pm$3.81	0.7027$\pm$0.2206	97.72$\pm$1.62	98.67$\pm$1.44

Confusion Matrix Time-Distributed AtzoriNet for Input 3X5X10 with Bidirectional LSTM Majority Voting
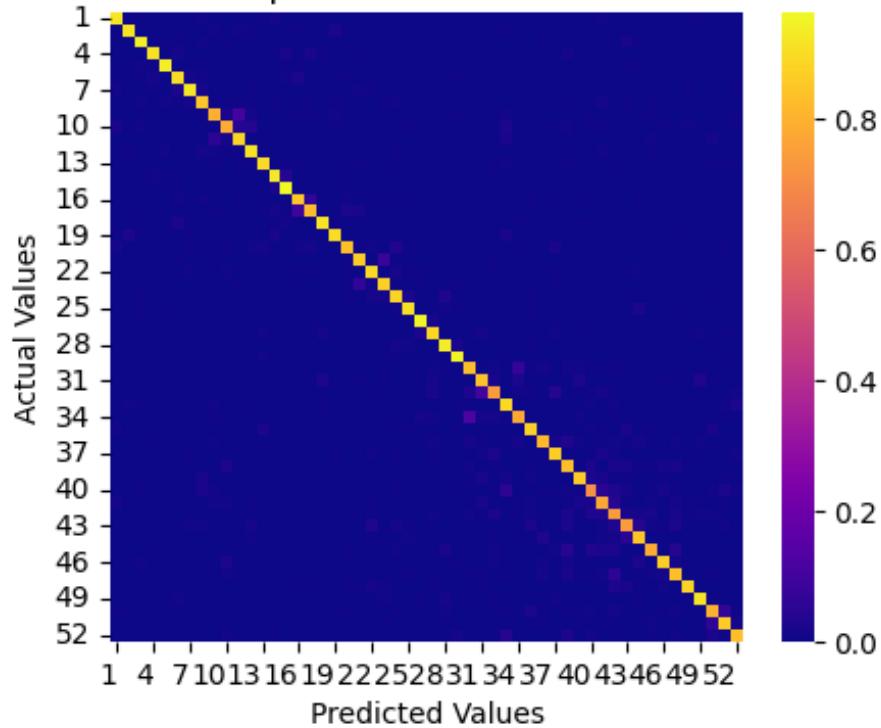
6. Experiment 5

Time-Distributed Input 3X15X10 with LSTM (Experiment 5) For Window Evaluation				
Subject	Accuracy (%)	Test Loss	Top 3 Accuracy (%)	Top 5 Accuracy (%)
1	86.08	0.7944	95.97	97.98
2	86.04	0.7423	96.44	98.08
3	83.19	0.9049	94.65	96.5
4	81.27	0.9288	95.01	97.36
5	84.26	0.8661	94.87	96.65
6	84.26	0.8623	94.02	96.65
7	84.62	0.8429	95.94	97.36
8	91.45	0.4916	97.51	98.65
9	87.25	0.7512	95.01	96.72
10	87.18	0.7097	95.23	97.5
11	87.89	0.7439	95.37	96.65
12	87.39	0.7119	95.87	98.08
13	82.41	1.08	93.59	95.73
14	89.6	0.5541	97.15	97.58
15	84.47	0.8102	95.44	96.86
16	76.28	1.3479	88.75	92.45
17	87.75	0.6139	95.87	97.86
18	77.35	1.2026	92.88	95.87
19	86.54	0.7735	95.66	96.94
20	91.8	0.4584	97.93	98.58
21	93.73	0.3936	97.93	99.35
22	94.16	0.3015	98.93	99.5
23	83.55	0.9516	93.87	95.94
24	90.17	0.4853	98.15	99.22
25	91.52	0.4928	96.65	98.22
26	91.52	0.5064	97.79	98.58
27	77.14	1.1313	92.52	95.09
Average	86.25±4.71	0.7575±0.2501	95.52±2.082	97.26±1.47

Πίνακας **Error! No text of specified style in document.**-4 Αποτελέσματα Time-Distributed AtzoriNet για είσοδο 3X15X10 με LSTM για τα Παράθυρα
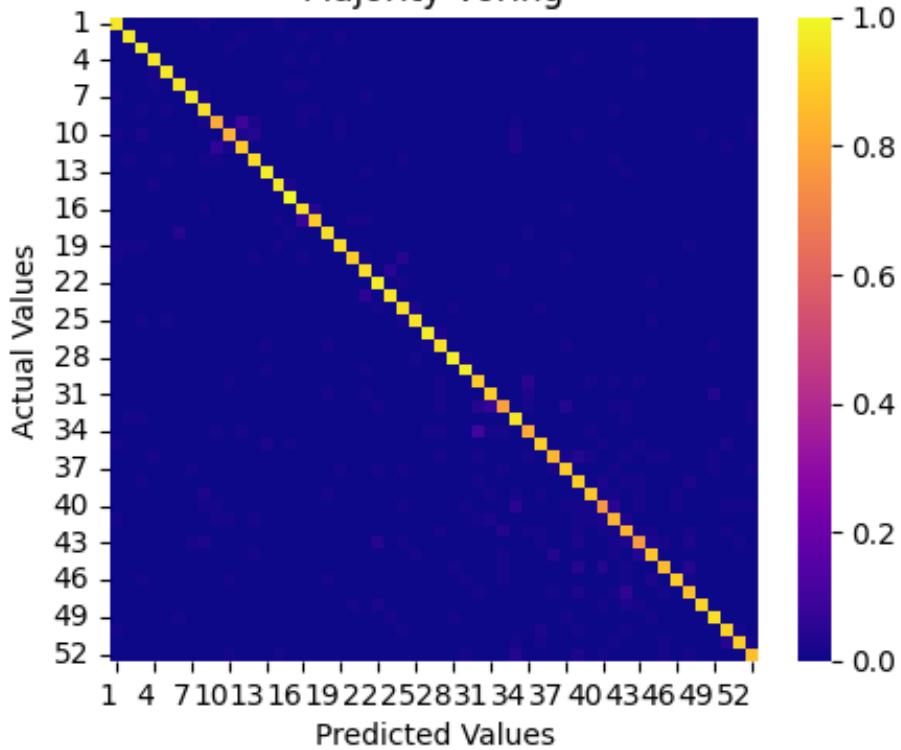
Confusion Matrix Time-Distributed AtzoriNet for Input 3X15X10 with LSTM

Time-Distributed Input 3X15X10 with LSTM (Experiment 5) Majority Voting				
Subject	Accuracy (%)	Test Loss	Top 3 Accuracy (%)	Top 5 Accuracy (%)
1	87.18	0.688	99.36	99.36
2	91.67	0.6343	98.08	99.36
3	89.1	0.7465	98.72	98.72
4	87.82	0.7703	97.44	100
5	91.03	0.743	98.08	98.08
6	89.74	0.7374	97.44	98.08
7	85.9	0.72229	97.44	99.36
8	93.59	0.4201	100	100
9	91.03	0.6614	98.72	99.36
10	92.31	0.5871	98.08	99.36
11	91.67	0.6499	98.08	98.08
12	94.23	0.5498	97.44	100
13	87.82	0.9349	94.87	98.08
14	95.51	0.4566	99.36	100
15	89.74	0.6645	98.72	98.72
16	79.49	1.2105	93.59	94.23
17	92.31	0.4997	98.72	100
18	84.62	1.0547	96.15	98.08

| 19	91.67	0.6411	97.44	98.72
20	94.23	0.364	99.36	100
21	97.44	0.3048	100	100
22	96.79	0.2127	99.36	100
23	91.03	0.7899	98.08	98.72
24	94.87	0.398	99.36	99.36
25	94.87	0.4229	98.72	100
26	94.87	0.3838	98.08	98.72
27	82.69	0.9545	95.51	98.72
Average	90.86 ±4.22	0.6371±0.2206	98.01±1.49	99±1.17
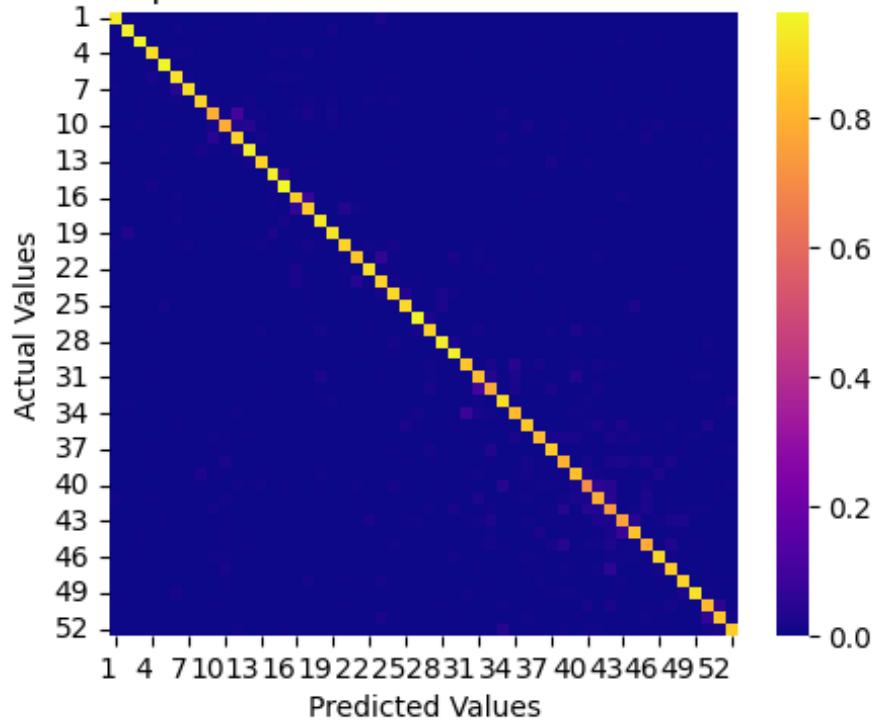
Confusion Matrix Time-Distributed AtzoriNet for Input 3X15X10 with LSTM Majority Voring

7. Experiment 6

Time-Distributed Input 3X15X10 with Bidirectional LSTM (Experiment 6) For Window Evaluation				
Subject	Accuracy (%)	Test Loss	Top 3 Accuracy (%)	Top 5 Accuracy (%)
1	86.82	0.7163	95.51	97.01
2	86.68	0.7791	96.43	98.36
3	85.26	0.9023	93.59	96.23
4	82.98	0.9087	95.72	97.86
5	84.26	0.8949	94.65	96.93
6	83.69	0.9342	94.52	96.15
7	86.11	0.7436	97.08	98.3
8	92.17	0.4787	97.65	98.72
9	87.75	0.762	95.94	97.65
10	87.82	0.6783	95.94	98.01
11	87.25	0.80358	94.65	95.94
12	87.89	0.7264	96.79	98.21
13	82.05	1.1795	91.45	94.37
14	89.88	0.5169	97.22	98.36
15	84.12	0.8261	94.8	96.94
16	77.35	1.398	89.25	92.59
17	89.03	0.6254	96.08	96.86
18	78.49	1.291	91.88	94.44
19	87.96	0.693	94.87	96.58
20	92.02	0.413	98.36	99.29
21	94.3	0.3549	98.43	98.93
22	94.52	0.3597	99.5	99.57
23	83.33	0.9303	95.51	97.36
24	90.74	0.4575	97.72	99.01
25	91.6	0.4584	97.22	98.22
26	92.24	0.4747	97.72	98.72
27	80.06	1.2264	93.02	95.51
Average	86.90±4.46	0.7605±0.2781	95.61±2.28	97.26±1.64

Confusion Matrix Time-Distributed AtzoriNet for Input 3X15X10 with Bidirectional LSTM

Time-Distributed Input 3X15X10 with Bidirectional LSTM (Experiment 5) Majority Voting				
Subject	Accuracy (%)	Test Loss	Top 3 Accuracy (%)	Top 5 Accuracy (%)
1	93.59	0.5825	98.08	100
2	91.67	0.6276	98.72	99.36
3	90.38	0.7872	97.44	98.72
4	89.1	0.7704	99.36	100
5	89.74	0.6236	98.72	99.36
6	89.1	0.7504	98.72	98.72
7	87.82	0.6206	97.44	100
8	97.44	0.3556	98.72	99.36
9	92.31	0.4955	98.08	99.36
10	89.1	0.5465	98.72	100
11	91.03	0.6789	97.44	97.44
12	92.95	0.6223	99.36	99.36
13	86.54	1.0479	94.23	96.15
14	94.87	0.3962	100	100
15	92.95	0.6294	98.72	98.72
16	83.97	1.2135	92.31	94.87
17	92.95	0.5385	97.44	99.39
18	83.97	1.1222	94.23	97.44

19	93.59	0.5681	98.08	98.72
20	96.15	0.3058	100	100
21	96.15	0.2661	100	100
22	96.79	0.2078	100	100
23	91.03	0.6806	98.08	98.72
24	96.15	0.3684	98.72	100
25	94.23	0.3505	98.72	99.36
26	94.87	0.3559	98.72	98.72
27	83.97	1.0425	96.15	97.44
Average	91.57±3.87	0.6131±0.2575	98.01±1.82	98.93±1.26

Confusion Matrix Time-Distributed AtzoriNet for Input 3X15X10 with Bidirectional LSTM Majority Voting