EPFL

ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE

EPFL COURSEWORK REPORT

Project Title

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15th December 2021

1 Data summary

date	control_type	all	success	failure	invalid_trials
03/25/2021	shared_control	6	5	1	[2021-03-25-15-01-20]
04/10/2021	mds	10	10	0	[]
04/10/2021	rds	15	13	2	[2021-04-10-10-58-23, 2021-04-10-12-24-53]
04/10/2021	shared_control	8	8	0	[]
04/24/2021	mds	6	6	0	[]
04/24/2021	rds	7	7	0	[]
04/24/2021	shared_control	9	9	0	[]
12/03/2021	shared_control	13	13	0	[]

2 Data from 0410 and 0424

mds : 16

rds : 20

shared_control : 17

2.1 Mean & Std

Metrics	mds_mean	mds_std	rds_mean	rds_std	sc_mean	sc_std
avg_crowd_density2_5	0.115182	0.028078	0.129016	0.029029	0.119270	0.034380
std_crowd_density2_5	0.084864	0.019079	0.089006	0.016883	0.089882	0.017760
max_crowd_density2_5	0.452000	0.080795	0.466006	0.119469	0.509296	0.134747
virtual_collision	3.500000	2.708013	7.050000	7.917170	4.235294	3.011009
avg_min_dist	1.189581	0.158005	1.077405	0.177220	1.181554	0.162462
rel_duration2goal	0.282311	0.092134	0.320189	0.100230	0.288379	0.075594
rel_path_length2goal	1.408097	0.206072	1.335369	0.199093	1.505392	0.509593
path_length2goal	21.563309	5.917861	20.457752	6.317681	27.186373	12.855538
duration2goal	70.427876	14.715994	63.322066	21.056213	59.768625	22.456179
min_dist2goal	4.743253	4.045612	6.750983	10.149561	4.611123	3.839255
rel_jerk	0.132651	0.060549	0.089996	0.031917	0.152425	0.023028
avg_fluency	0.972435	0.016480	0.989375	0.008680	0.954358	0.015226
contribution	0.580148	0.119643	0.894287	0.090359	0.494066	0.205528
avg_agreement	0.711429	0.060817	0.744966	0.038866	0.884805	0.016793

2.2 p-value

Metrics	mds-rds	mds-shared	rds-shared	total
rel_duration2goal	2.512015e-01	2.903194e-01	8.370692e-01	3.988235e-01
rel_path_length2goal	2.911157e-01	1.774617e-01	4.827261e-01	3.099871e-01
min_dist2goal	4.621803e-01	4.180680e-01	9.239271e-01	5.795098e-01
avg_fluency	3.539208e-04	2.414122e-10	2.600105e-03	2.105566e-09
contribution	1.701803e-10	2.956701e-09	1.548738e-01	4.706047e-11
avg_agreement	5.248126e-02	1.098759e-15	1.549141e-12	2.191512e-16
avg_crowd_density2_5	1.585934e-01	3.560788e-01	7.118392e-01	3.788670e-01
max_crowd_density2_5	6.910982e-01	3.073592e-01	1.517666e-01	3.282766e-01
avg_min_dist	5.598230e-02	7.273175e-02	8.866349e-01	8.297768e-02
rel_jerk	1.022116e-02	9.072208e-08	2.190200e-01	7.961132e-05
virtual_collision	9.618338e-02	1.760267e-01	4.672927e-01	1.168014e-01

2.3 F-statistics

Metrics	mds-rds	mds-shared	rds-shared	total
rel_duration2goal	1.362644	1.152758	0.043007	0.936345
rel_path_length2goal	1.149934	1.894285	0.504762	1.199093
min_dist2goal	0.553056	0.671519	0.009268	0.551569
avg_fluency	15.752653	76.710532	10.727647	30.591099
contribution	80.639450	61.993320	2.126022	39.719292
avg_agreement	4.037859	189.366806	128.025247	80.757276
avg_crowd_density2_5	2.077901	0.874652	0.138975	0.989656
max_crowd_density2_5	0.160615	1.073062	2.159508	1.139087
avg_min_dist	3.915727	3.423484	0.020662	2.617322
rel_jerk	7.395997	45.025074	1.573888	11.467082
virtual_collision	2.927673	1.907225	0.541625	2.242194

3 All shared_control data

1203: 13

0424: 9

0410: 8

0325: 5

3.1 Analysis given date

3.1.1 Mean & Std

Metrics	0325_mean	0325_std	0410_mean	0410_std	0424_mean	0424_std	1203_mean	1203_std
avg_crowd_density2_5	0.054568	0.005142	0.088744	0.010305	0.146405	0.022602	0.261741	0.038449
std_crowd_density2_5	0.054656	0.001659	0.074453	0.008254	0.103596	0.011027	0.142428	0.013137
max_crowd_density2_5	0.285206	0.027895	0.420169	0.045144	0.588520	0.139734	0.748273	0.093874
avg_crowd_density5	0.063878	0.008102	0.105671	0.010102	0.145792	0.016898	0.180780	0.022898
std_crowd_density5	0.035999	0.003034	0.043323	0.003511	0.061201	0.005408	0.078690	0.010976
max_crowd_density5	0.211358	0.017082	0.253056	0.030005	0.345189	0.032113	0.421148	0.041409
virtual_collision	1.400000	1.673320	4.250000	3.370036	4.222222	2.862594	10.923077	9.031994
avg_min_dist	1.717142	0.179279	1.311429	0.099335	1.066110	0.110875	0.831233	0.089171
rel_duration2goal	0.379606	0.074838	0.323986	0.076341	0.256728	0.062726	0.230464	0.108602
rel_path_length2goal	1.198281	0.217506	1.458339	0.573675	1.547216	0.476679	2.283629	3.870621
path_length2goal	36.137142	4.866597	28.225304	14.102476	26.262880	12.428638	33.448952	2.954294
duration2goal	68.606075	12.143353	57.129754	28.293821	62.114288	17.173633	101.372966	30.923000
min_dist2goal	1.840448	1.638693	2.835881	1.907087	6.189116	4.510499	4.224270	3.916663
rel_jerk	0.120737	0.025826	0.136816	0.024800	0.166299	0.007888	0.160034	0.031648
avg_fluency	0.954195	0.009416	0.949613	0.020554	0.958576	0.007174	0.938521	0.014129
contribution	0.654564	0.162608	0.428046	0.256288	0.552751	0.137030	0.744049	0.085531
avg_agreement	0.681743	0.028696	0.895437	0.011826	0.875354	0.015103	0.695130	0.031169

3.1.2 p-value

Metrics	12	13	14	23	24	34	total
rel_duration2goal	2.244622e-01	6.486516e-03	1.284324e-02	0.064649	4.696613e-02	5.223132e-01	1.027542e-02
rel_path_length2goal	3.585357e-01	1.520184e-01	5.472258e-01	0.731985	5.599956e-01	5.792994e-01	7.878338e-01
min_dist2goal	3.564684e-01	6.282565e-02	2.126295e-01	0.070359	3.638463e-01	2.894989e-01	1.207239e-01
avg_fluency	6.521967e-01	3.451020e-01	3.724604e-02	0.237320	1.577864e-01	8.811472e-04	1.586286e-02
contribution	1.075034e-01	2.352050e-01	1.416349e-01	0.222522	5.534751e-04	6.346712e-04	1.067524e-03
avg_agreement	9.161777e-10	1.051809e-09	4.175826e-01	0.008561	4.437338e-13	7.214694e-13	4.312886e-20
avg_crowd_density2_5	2.864539e-05	1.384349e-06	2.661727e-09	0.000008	1.606394e-10	1.055815e-07	2.259512e-16
max_crowd_density2_5	9.508037e-05	4.974356e-04	1.108762e-08	0.005384	2.025266e-08	4.304320e-03	2.292756e-10
avg_min_dist	2.488220e-04	2.040215e-06	1.681850e-10	0.000244	5.414613e-10	2.187311e-05	5.538820e-15
rel_jerk	2.864904e-01	2.945582e-04	2.541228e-02	0.004033	9.402565e-02	5.700312e-01	6.309574e-03
virtual_collision	1.095436e-01	6.857785e-02	3.521422e-02	0.985576	6.121720e-02	4.501577e-02	1.220644e-02

3.1.3 F-statistics

Metrics	12	13	14	23	24	34	total
rel_duration2goal	1.656790	10.809182	7.839604	3.976374	4.513835	0.424096	4.456023
rel_path_length2goal	0.918200	2.339942	0.378181	0.121759	0.351972	0.317632	0.352195
min_dist2goal	0.926453	4.204202	1.685255	3.795309	0.865605	1.183917	2.097855
avg_fluency	0.214626	0.965915	5.161379	1.515069	2.162449	15.238772	4.019442
contribution	3.070732	1.561953	2.390352	1.619588	17.159577	16.354302	6.916901
avg_agreement	361.713180	282.463361	0.692441	9.138896	298.762109	256.240391	191.673445
avg_crowd_density2_5	46.554594	77.594562	138.962796	43.730801	152.359698	64.824121	105.779793
max_crowd_density2_5	35.475322	22.273311	113.809388	10.562130	84.403077	10.362605	37.023655
avg_min_dist	28.189055	72.047059	202.455216	22.836583	131.906656	30.283421	84.060840
rel_jerk	1.254849	25.293070	6.074854	11.497413	3.107198	0.333533	4.959032
virtual_collision	3.031041	4.002564	5.292078	0.000338	3.958773	4.572503	4.281644

3.2 Analysis given cluster

0: 14; 1: 11: 2: 10

3.2.1 Mean-Std

Metrics	cluster0_mean	cluster0_std	cluster1_mean	cluster1_std	cluster2_mean	cluster2_std
avg_crowd_density2_5	0.079831	0.023681	0.265482	0.044719	0.166514	0.040858
std_crowd_density2_5	0.069001	0.014463	0.142635	0.013773	0.111783	0.018554
max_crowd_density2_5	0.363783	0.065822	0.787094	0.065869	0.606062	0.077611
avg_crowd_density5	0.093543	0.025497	0.184683	0.022727	0.148592	0.019271
std_crowd_density5	0.043235	0.008973	0.078149	0.011586	0.063543	0.012425
max_crowd_density5	0.246463	0.040451	0.422484	0.044406	0.356507	0.051980
virtual_collision	2.928571	3.049950	12.272727	9.198814	4.500000	2.460804
avg_min_dist	1.437449	0.246641	0.833333	0.103076	1.018722	0.171009
rel_duration2goal	0.332581	0.088745	0.199061	0.082951	0.295069	0.077340
rel_path_length2goal	1.488089	0.581644	2.555228	4.183215	1.232948	0.152305
path_length2goal	33.211262	13.315890	33.548374	3.342974	24.370058	5.817516
duration2goal	63.976548	24.493620	104.999753	32.447876	62.627659	14.390251
min_dist2goal	3.785185	4.282015	4.745435	4.023276	3.731447	2.432941
rel_jerk	0.137513	0.029300	0.161356	0.028287	0.157524	0.024793
avg_fluency	0.953087	0.016346	0.944610	0.011460	0.946192	0.018851
contribution	0.522085	0.233440	0.737470	0.101857	0.592323	0.163027
avg_agreement	0.817907	0.106873	0.713945	0.054875	0.818299	0.098163

3.2.2 p-value

3.2.3 F-statistics

Metrics	c0-c1	c0-c2	c1-c2	total
rel_duration2goal	8.340217e-04	NaN	8.340217e-04	5.681661e-04
rel_path_length2goal	3.528028e-01	1.0	3.528028e-01	4.231889e-01
min_dist2goal	5.733204e-01	1.0	5.733204e-01	8.153828e-01
avg_fluency	1.582718e-01	1.0	1.582718e-01	3.024260e-01
contribution	9.173597e-03	1.0	9.173597e-03	2.053532e-02
avg_agreement	7.560155e-03	1.0	7.560155e-03	1.539435e-02
avg_crowd_density2_5	2.455158e-12	1.0	2.455158e-12	8.627144e-18
max_crowd_density2_5	6.220650e-14	1.0	6.220650e-14	8.826810e-19
avg_min_dist	1.040116e-07	1.0	1.040116e-07	1.634814e-08
rel_jerk	5.191179e-02	1.0	5.191179e-02	8.329432e-02
virtual_collision	1.599543e-03	NaN	1.599543e-03	1.454228e-04

Metrics	c0-c1	c0-c2	c1-c2	total
rel_duration2goal	14.754118	-3.807820e-31	14.754118	9.263363
rel_path_length2goal	0.899396	0.000000e+00	0.899396	0.880809
min_dist2goal	0.326413	3.802955e-32	0.326413	0.205259
avg_fluency	2.126718	0.000000e+00	2.126718	1.236542
contribution	8.092685	3.029319e-32	8.092685	4.336876
avg_agreement	8.573982	0.000000e+00	8.573982	4.697324
avg_crowd_density2_5	178.945668	0.000000e+00	178.945668	141.690798
max_crowd_density2_5	254.616144	0.000000e+00	254.616144	163.252250
avg_min_dist	57.640519	0.000000e+00	57.640519	30.736866
rel_jerk	4.203317	0.000000e+00	4.203317	2.665138
virtual_collision	12.791240	-1.590070e-32	12.791240	11.407601

4 All data

mds : 16

rds : 20

shared_control : 35

4.1 Mean & Std

Metrics	mds_mean	mds_std	rds_mean	rds_std	sc_mean	sc_std
avg_crowd_density2_5	0.115182	0.028078	0.129016	0.029029	0.162945	0.086569
std_crowd_density2_5	0.084864	0.019079	0.089006	0.016883	0.104367	0.035098
max_crowd_density2_5	0.452000	0.080795	0.466006	0.119469	0.566046	0.194041
avg_crowd_density5	0.116808	0.018398	0.126946	0.020605	0.137915	0.045285
std_crowd_density5	0.049867	0.009850	0.051916	0.013657	0.060010	0.018361
max_crowd_density5	0.269768	0.038680	0.284569	0.053587	0.333225	0.088077
virtual_collision	3.500000	2.708013	7.050000	7.917170	6.314286	6.871816
avg_min_dist	1.189581	0.158005	1.077405	0.177220	1.127947	0.324282
rel_duration2goal	0.282311	0.092134	0.320189	0.100230	0.279900	0.099715
rel_path_length2goal	1.408097	0.206072	1.335369	0.199093	1.750578	2.366219
path_length2goal	21.563309	5.917861	20.457752	6.317681	30.791151	9.850860
duration2goal	70.427876	14.715994	63.322066	21.056213	76.484159	31.270296
min_dist2goal	4.743253	4.045612	6.750983	10.149561	4.071624	3.681448
rel_jerk	0.132651	0.060549	0.089996	0.031917	0.150724	0.029126
avg_fluency	0.972435	0.016480	0.989375	0.008680	0.948453	0.015811
contribution	0.580148	0.119643	0.894287	0.090359	0.609845	0.198630
avg_agreement	0.711429	0.060817	0.744966	0.038866	0.785345	0.101039

4.2 p-value

Metrics	mds-rds	mds-shared	rds-shared	total
rel_duration2goal	2.512015e-01	1.561040e-01	0.935001	3.176208e-01
rel_path_length2goal	2.911157e-01	4.388335e-01	0.568050	6.272443e-01
min_dist2goal	4.621803e-01	1.628734e-01	0.560438	3.132483e-01
avg_fluency	3.539208e-04	8.434258e-15	0.000009	8.286446e-15
contribution	1.701803e-10	1.570469e-07	0.583326	8.046570e-09
avg_agreement	5.248126e-02	9.297562e-02	0.009437	8.908996e-03
avg_crowd_density2_5	1.585934e-01	9.626100e-02	0.036886	3.167345e-02
max_crowd_density2_5	6.910982e-01	4.180238e-02	0.028739	1.962525e-02
avg_min_dist	5.598230e-02	5.232157e-01	0.475348	4.376281e-01
rel_jerk	1.022116e-02	2.278426e-09	0.154024	2.783084e-06
virtual_collision	9.618338e-02	7.192868e-01	0.121446	2.399677e-01

4.3 F-statistics

Metrics	mds-rds	mds-shared	rds-shared	total
rel_duration2goal	1.362644	2.069971	0.006720	1.166460
rel_path_length2goal	1.149934	0.608472	0.330407	0.469633
min_dist2goal	0.553056	2.002652	0.343620	1.180801
avg_fluency	15.752653	113.746013	24.611990	54.235745
contribution	80.639450	36.467188	0.304917	24.823273
avg_agreement	4.037859	2.926659	7.301886	5.064122
avg_crowd_density2_5	2.077901	2.867405	4.603602	3.633630
max_crowd_density2_5	0.160615	4.351630	5.078073	4.167194
avg_min_dist	3.915727	0.413011	0.517451	0.836511
rel_jerk	7.395997	51.613438	2.096304	15.530784
virtual_collision	2.927673	0.130562	2.483984	1.457631