

Every Team Deserves a Second Chance: Identifying when Things Go Wrong

Vaishnavh Nagarajan^{1*}, Leandro Soriano Marcolino^{2*}, Milind Tambe²
¹ Indian Institute of Technology Madras, Chennai, Tamil Nadu, 600036, India
 vaish@cse.iitm.ac.in
² University of Southern California, Los Angeles, CA, 90089, USA
 {sorianom, tambe}@usc.edu

APPENDIX

A. ADDITIONAL EXPERIMENTS

We present here additional experiments, to complement Section 5 of the main paper. In particular, we show the performance of our online predictions, when comparing with the final outcome of the game, instead of Perfect’s evaluation. We present these results because some readers could be interested in seeing the results under this alternative evaluation methodology. However, as we discuss in the main paper, because of the dynamic changes that occur in a game, we argue that the results reported in the main paper (in Figure 4 and 6) are more precise.

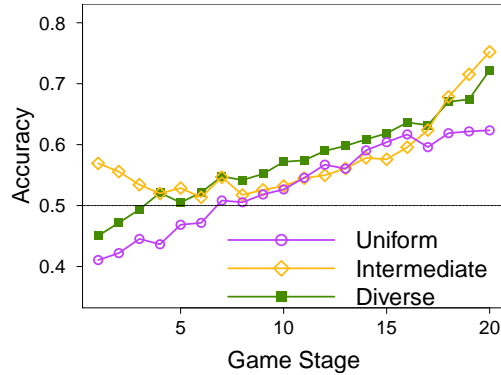
We can see the results for the full feature vector in Figure 7, and for the reduced one in Figure 8. As we can see, the accuracy increases slower for *diverse* and *uniform* under this alternative evaluation methodology, but we can still achieve around 60% accuracy when doing the prediction online for all 3 teams from around the middle of the games.

B. LEARNED FUNCTIONS

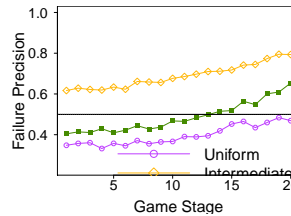
We present here the coefficients learned in our experiments. In Table 4, 5, 6, we present the associated coefficients for the *diverse*, *intermediate* and *uniform* teams, respectively. Note that we use a binary number to represent each subset, where 1 indicates that the agent agreed on the chosen action and 0 indicates that the agent did not agree on the chosen action. For example, the number 100111 represents the case where the 1st, the 4th, the 5th and the 6th agents agree together on the chosen action, whereas the 2nd and the 3rd agent do not agree with the chosen action.

For the *diverse* team, the order that we list the agents is: Fuego, GnuGo, Pachi, Mogo, Fuego Δ and Fuego Θ . The winning rates of these agents when playing against Fuego is shown in Table 7. We also list the winning rates of the agents of the *intermediate* team in Table 8, in the same order as in our binary representation.

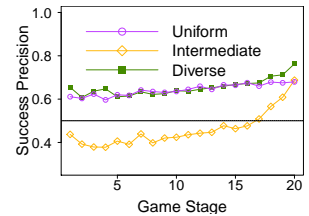
Finally, we show in Table 9 the learned coefficients for the reduced feature vector.



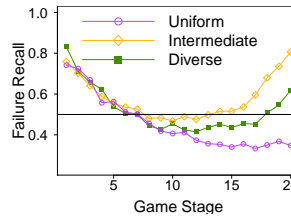
(a) Accuracy



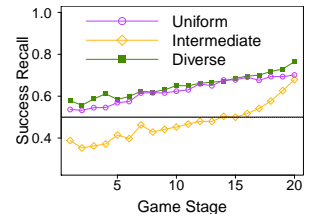
(b) Failure Precision



(c) Success Precision



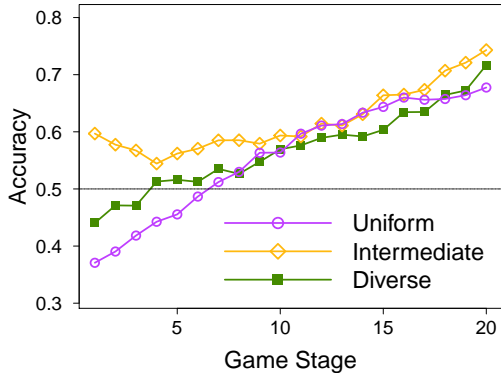
(d) Failure Recall



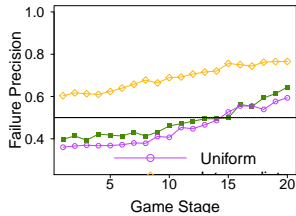
(e) Success Recall

Figure 7: Performance metrics over all turns of 691 games, using the full feature vector.

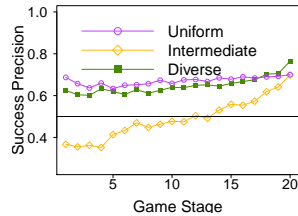
*Vaishnavh Nagarajan and Leandro Soriano Marcolino are both first authors of this paper.



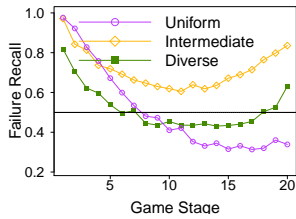
(a) Accuracy



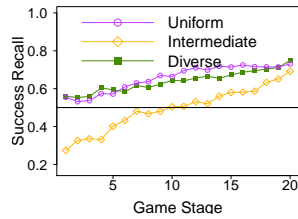
(b) Failure Precision



(c) Success Precision



(d) Failure Recall



(e) Success Recall

Figure 8: Performance metrics over all turns of 691 games, using the reduced feature vector.

Subset	Coefficient	Subset	Coefficient
000001	-21.1832952674042	100000	-0.686608906252656
000010	-22.4440649876748	100001	-14.2617487047842
000011	-21.2382833002728	100010	-19.7983854503157
000100	-18.9745315546573	100011	-16.6409650012489
000101	-5.57856276519641	100100	-18.1649367166521
000110	-17.0577136847191	100101	-7.8257139020982
000111	-12.5075840024676	100110	-1.03206798772752
001000	-7.12758043978195	100111	-8.31681715558336
001001	-29.0409069764077	101000	-9.8230257767044
001010	-17.9195268475461	101001	-23.3327715445511
001011	-14.5610031412404	101010	-17.190187774984
001100	-27.7292309294473	101011	-11.5777812047819
001101	-9.29495173837535	101100	-4.39932099011019
001110	-18.7029607751243	101101	-5.51875085115904
001111	-6.877830079104	101110	-5.1253405667019
010000	-3.51090591184698	101111	-2.4003998019042
010001	-8.94191734204108	110000	-10.3145650750112
010010	-10.7009851557745	110001	-2.68491016548046
010011	-4.58096074406825	110010	-2.5365007633883
010100	-9.91330433887834	110011	-9.77732468180333
010101	-15.6256120242955	110100	10.4632329342607
010110	-39.3267399736612	110101	-4.90553091366541
010111	4.5726476731752	110110	-0.484777305430101
011000	-6.9617935817421	110111	0.874463172513935
011001	-5.95592955357403	111000	-9.8892269068291
011010	-16.2481855820618	111001	4.41723108047579
011011	2.54061944345843	111010	-3.21289685544371
011100	0.971142272250812	111011	3.01457380953515
011101	-4.56424933681643	111100	-9.21994995722551
011110	7.9248023332017	111101	-7.26597355333464
011111	-0.328969917555944	111110	3.69645889600355
Intercept	9.63421654589551		

Table 4: Learned coefficients for the *diverse* team.

Subset	Coefficient	Subset	Coefficient
000001	-19.3375537597029	100000	-17.3774483871997
000010	-58.373894749436	100001	-13.7186375005633
000011	-44.7930821173152	100010	-9.57823892293822
000100	-29.7917539877676	100011	-20.7317358478172
000101	-32.9816994734736	100100	-16.9912466689656
000110	-22.8286815624051	100101	-30.7655099923052
000111	-19.338165555575	100110	-6.87898245708579
001000	-23.5213229459913	100111	-20.7605163688714
001001	-12.3382886471511	101000	-7.06744340490173
001010	-22.1546093537712	101001	-13.5535100438153
001011	-13.3875763006308	101010	-6.95420290974105
001100	6.32107280584538	101011	-13.1314416186086
001101	3.20008773132166	101100	-16.2058058663418
001110	-6.70550437173213	101101	-21.1618452908586
001111	-3.68074173960026	101110	-4.27563472228422
010000	-24.1248357460473	101111	-8.6857942192544
010001	-17.819972662787	110000	-11.1740019261238
010010	-22.7379400577667	110001	-26.6293438022721
010011	-29.8070221685496	110010	-20.5372214218816
010100	-30.7919957562725	110011	-17.7809535800794
010101	-10.511086472944	110100	-8.1009014504951
010110	-19.3206067877639	110101	-11.3143108478615
010111	-12.1237793144717	110110	-18.2570116786729
011000	-14.4733621215643	110111	-19.8342763614458
011001	-14.2395092055673	111000	-9.11586448761135
011010	-0.768472453280317	111001	-8.44688226689351
011011	-16.1345002380822	111010	-13.5682041906219
011100	-4.2209762341674	111011	-13.1551163899623
011101	-5.22920260112528	111100	-6.60323762696691
011110	-10.6502818549958	111101	-0.871240880694516
011111	-5.56183029661861	111110	-8.37243780293762
Intercept	10.5036311929481		

Table 5: Learned coefficients for the *intermediate* team.

Subset	Coefficient	Subset	Coefficient
000001	-7.03840676003821	100000	-20.9425629475364
000010	-29.4976323279213	100001	-9.65537850585606
000011	-12.4707013256115	100010	-12.2465743801344
000100	-14.3962911044896	100011	-3.48420351829791
000101	-17.8634945301119	100100	-11.7410352850111
000110	-16.5286859782144	100101	-9.53715976512016
000111	-6.50105634605574	100110	-8.30378103254118
001000	-16.4112974032273	100111	-7.5617217116919
001001	-14.0929635274458	101000	-3.06632523417598
001010	-5.16472442071685	101001	-7.3409952324382
001011	-3.35237068938776	101010	-13.0970039559564
001100	1.98604575357101	101011	1.80933993561149
001101	-3.06871333651519	101100	-14.454963156183
001110	-7.08201926562727	101101	-15.5206327245444
001111	-2.12506549629772	101110	-8.27197674136342
010000	-46.6575632030272	101111	-0.981321953700304
010001	-15.735602904236	110000	-17.0325167383579
010010	-13.4762313235923	110001	-9.2389601337946
010011	1.01143101607701	110010	-9.13377162847041
010100	-5.02501161742997	110011	-14.9893036768517
010101	-12.9425387895056	110100	-13.5151440707507
010110	-5.90012309476711	110101	-2.55245411156848
010111	-2.18348644537088	110110	-4.71300594959694
011000	-26.3036957851695	110111	-0.44405051719988
011001	-8.92586660007418	111000	-2.31989462126869
011010	-1.51609416290326	111001	-7.56131122311918
011011	-5.49425355309996	111010	-3.66508349061898
011100	-13.0805407682624	111011	-5.87984049443467
011101	3.84744550964523	111100	-5.48854860244356
011110	-6.45351669747884	111101	-2.15132085967478
011111	-3.77422127669593	111110	-2.57137742067336
Intercept	4.90077031854713		

Table 6: Learned coefficients for the *uniform* team.

Agent	Winning Rate
Fuego	48.1%
GnuGo	1.1%
Pachi	25.7%
MoGo	27.6%
Fuego Δ	45.7%
Fuego Θ	45.5%

Table 7: Winning rates of individual agents of *diverse* team.

Agent	Winning Rate
Agent 1	33.2%
Agent 2	32.8%
Agent 3	28.7%
Agent 4	25.7%
Agent 5	24.8%
Agent 6	24.6%

Table 8: Winning rates of individual agents of *intermediate* team.

Team	Intercept	1	2	3	4	5
Uniform	4.652501	-19.758884	-11.399695	-7.106329	-5.206332	-2.442425
Intermediate	9.582986	-25.955090	-15.156255	-13.218733	-12.245260	-12.215972
Diverse	9.582048	-17.453249	-16.830709	-10.511093	-6.658564	-3.863345

Table 9: Coefficients of the reduced feature vector.