

## Meta-learning Based Selection of Software Reliability Models

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**Abstract** This text presents supplementary material to the paper "Meta-learning Based Selection of Software Reliability Models" submitted to the Automated Software Engineering journal, April, 2015.

**Keywords** Software reliability models · meta-learning · data mining

Tables 1, 2, 3, 4 and 5 present the results from Costa et al. [1], which are used to illustrate and evaluate our Meta-learning approach. They are related to the models JAM, GEO, ANN and GP and 16 datasets provided by "The Data & Analysis Center for Software"(DACS) [2]. The data are from different applications and include beside other information the Time Between Failures (TBF). The models were compared considering five performance measures: Maximum Deviation (*MD*); Average Bias (*AB*); Average Error (*AE*); Prediction Error (*PE*); and Correlation Coefficient (*CC*). To apply GP, the authors used two set of functions, because of this, they named GP1 and GP2 the models obtained by using GP with, respectively, function sets 1 and 2. The data provided in the work of [1] are used as past reliability models information to exemplify and evaluate our selection approach. Observe in the tables that the models JAM and GEO do not converge for four datasets (out 16). Due to this, these data sets were not included in our evaluation.

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## References

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**Table 1** Jelinski–Moranda Model

Project	<i>MD</i>	<i>PE</i>	<i>AB</i>	<i>AE</i>	<i>CC</i>
1	27.01	27.01	6.37	14.39	97.50
14C	-	-	-	-	-
17	14.40	5.89	4.89	6.21	99.46
2	30.73	30.73	21.68	22.42	96.93
27	34.05	34.05	8.90	18.50	96.25
3	35.38	35.38	19.46	19.48	95.79
4	7.27	4.91	6.64	10.59	99.46
40	24.30	24.30	2.11	14.50	98.21
5	34.92	34.92	17.84	20.46	99.46
6	10.34	10.34	12.92	18.60	98.41
SS1A	-	-	-	-	-
SS1B	19.01	19.01	11.08	14.41	98.60
SS1C	8.67	8.67	5.20	9.88	99.39
SS2	-	-	-	-	-
SS3	-	-	-	-	-
SS4	7.28	0.62	1.73	5.67	99.84

**Table 2** Geometric Model

Project	<i>MD</i>	<i>PE</i>	<i>AB</i>	<i>AE</i>	<i>CC</i>
1	6.37	3.67	4.15	7.69	99.71
14C	-	-	-	-	-
17	27.08	27.08	-0.36	7.85	98.14
2	8.84	8.28	3.51	6.46	99.50
27	7.43	1.64	0.61	12.24	98.11
3	7.58	3.91	1.23	9.80	99.57
4	72.66	72.66	-1.62	14.55	95.56
40	68.31	56.30	-16.64	28.03	94.62
5	29.88	29.88	11.16	17.41	99.47
6	9.64	6.83	9.33	15.72	98.28
SS1A	-	-	-	-	-
SS1B	17.40	17.40	8.80	13.10	98.76
SS1C	1.40	0.81	3.07	9.41	99.56
SS2	-	-	-	-	-
SS3	-	-	-	-	-
SS4	6.59	0.49	1.63	5.44	99.84

**Table 3** Artificial Neural Network Model

Project	<i>MD</i>	<i>PE</i>	<i>AB</i>	<i>AE</i>	<i>CC</i>
1	13.82	-4.88	6.77	7.15	99.29
14C	12.53	12.53	6.32	6.32	99.51
17	17.67	-12.48	-12.33	12.33	99.31
2	28.54	28.54	20.98	20.98	98.29
27	24.17	24.17	11.11	11.11	98.72
3	33.02	33.02	16.17	16.35	95.25
4	8.55	0.45	-2.30	3.54	99.61
40	12.20	4.79	7.36	7.36	99.47
5	22.15	-14.17	-13.73	13.87	99.21
6	19.68	19.68	10.88	10.88	98.74
SS1A	11.60	11.60	3.23	5.17	99.47
SS1B	21.91	21.91	12.04	12.04	98.61
SS1C	11.32	11.32	1.95	5.70	99.33
SS2	18.54	-18.54	7.49	7.52	99.34
SS3	8.21	8.21	3.41	3.62	99.80
SS4	23.63	23.63	12.54	12.54	98.46

**Table 4** GP Model (Function Set 1)

Project	<i>MD</i>	<i>PE</i>	<i>AB</i>	<i>AE</i>	<i>CC</i>
1	-9.254	-25.268	-3.190	6.750	98.57
14C	170.210	170.210	360.840	356.410	12.60
17	12.728	9.340	2.270	9.680	98.24
2	11.556	4.818	2.274	4.084	99.60
27	56.320	54.210	19.240	17.660	85.22
3	80.240	82.410	15.610	17.450	66.32
4	-157.636	-157.642	-12.210	15.864	89.50
40	-116.056	-118.026	-27.838	38.818	90.44
5	9.790	9.234	-6.562	15.072	99.33
6	23.896	13.540	5.444	9.456	98.10
SS1A	5.334	5.302	-4.086	8.616	98.89
SS1B	18.436	18.436	3.118	9.798	98.87
SS1C	11.144	11.144	-1.640	10.462	97.22
SS2	14.176	11.272	-0.068	14.660	95

**Table 5** GP Model (Function Set 2)

<i>Project</i>	<i>MD</i>	<i>PE</i>	<i>AB</i>	<i>AE</i>	<i>CC</i>
1	11.200	11.340	2.650	4.550	98 .52
14C	-52.218	-52.218	-7.664	13.906	95 .45
17	22.330	20.410	2.140	14.240	96 .54
2	15.200	16.010	4.210	7.210	97 .24
27	3.759	2.235	-1.612	14.066	96 .75
3	3.966	3.966	-2.382	11.234	92 .22
4	203.210	201.230	14.320	21.440	82 .30
40	175.210	175.210	52.210	57.400	81 .24
5	2.650	2.650	9.330	10.540	95 .70
6	24.010	16.450	11.440	11.230	94 .24
SS1A	35.440	39.210	9.880	12.320	97 .66
SS1B	23.490	23.410	13.870	19.740	96 .54
SS1C	9.340	9.150	17.660	16.650	97 .20
SS2	12.670	4.440	11.740	12.060	94 .05
SS3	27.120	28.470	11.960	11.080	96 .30
SS4	17.990	13.970	10.880	27.850	97 .99