Comparison of IFS Similarity Measures - Report

IFSSimReporter 1.0.6250.29793

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1 Experiment Settings

1.1 Similarity Measures

The following similarity measures for intuitionistic fuzzy sets were used through the experiment: AoD ([1]), VB-0.5 ([2]), H3D ([3]), E-3D ([3]), GGeo-3D-2 ([4]), GGeo-3D-1 ([4]), GGeo-3D-4 ([4]), X17-2 ([4]), X17-0.5 ([4]), X19 ([4]), X21 ([4]), CC ([5]), Ch ([6]), HK ([7]), HY15 ([8]), HY16 ([8]), BA-1-2 ([9]), BA-2-4 ([9]), N26 ([10]), XY19 ([11]), COS ([12]), SK1-2D ([13]), SK2-2D ([13]), SK3-2D ([13]), SK4-2D ([13]), XVB-0-0.05 ([1]), XVB-0-0.1 ([1]), XVBr-1-10 ([1]), XVBr-0.5-10 ([1]), XVBr-0-10 ([1]), XVBr-1-5 ([1]), XVBr-0.5-5 ([1]), XVBr-0-5 ([1]), XVBr-1 ([1]), XVBr-0.5 ([1]), XVBr-0 ([1]).

1.2 Testing Data

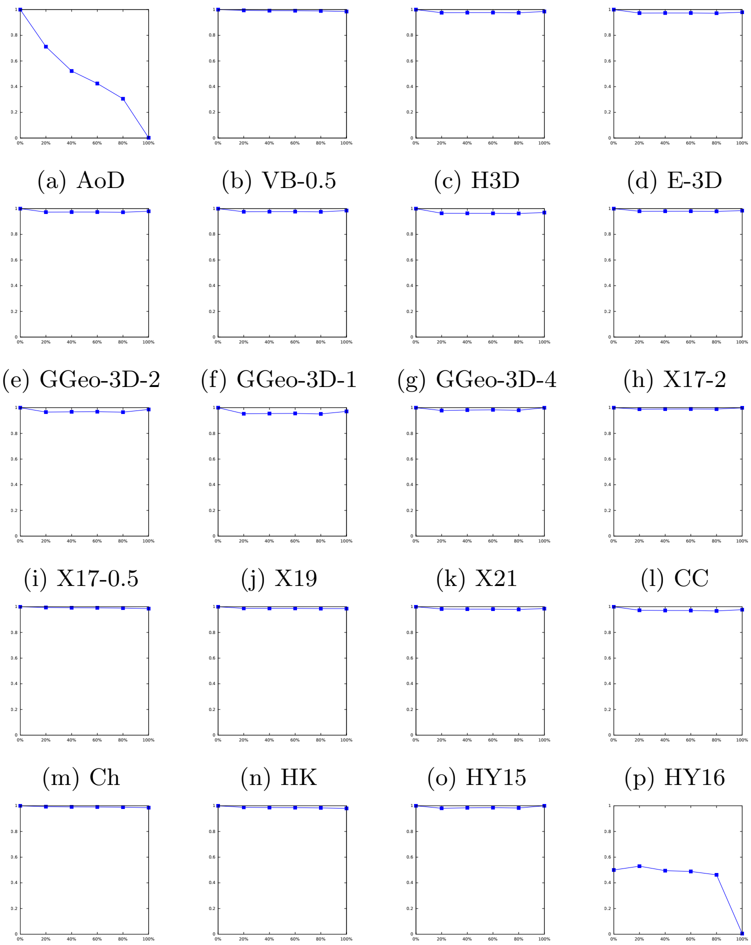
The following categories from the RCV1 data set were used in the experiment: E11, ECAT, GJOB.

2 Results

Table 1: Linear models and m-indices for each *SM-vs.-OP* representing the relationship between the averages levels that result from the (configuration of) similarity measure *SM* and the percentage of opposites *OP*.

	SM-vs.-OP (linear model: $y = ax + b$)			
Similarity Measure (SM)	slope (a)	intercept (b)	R^2	m-index
VB-0.5	−0.0125	0.9982	0.9093	0.0137
H3D	−0.0108	0.9870	0.1718	0.0022
E-3D	−0.0150	0.9862	0.2697	0.0048
GGeo-3D-2	−0.0150	0.9862	0.2697	0.0048
GGeo-3D-1	−0.0108	0.9870	0.1718	0.0022
GGeo-3D-4	−0.0226	0.9818	0.3303	0.0089
X17-2	−0.0114	0.9896	0.2758	0.0038
X17-0.5	−0.0099	0.9806	0.0676	0.0008
X19	−0.0212	0.9748	0.1756	0.0044
X21	0.0008	0.9867	0.0008	0.0000
CC	−0.0005	0.9928	0.0012	0.0000
Ch	−0.0125	0.9982	0.9093	0.0137
HK	−0.0113	0.9944	0.5724	0.0078
HY15	−0.0119	0.9908	0.3386	0.0049
HY16	−0.0187	0.9857	0.3395	0.0076
BA-1-2	−0.0123	0.9977	0.8803	0.0131
BA-2-4	−0.0165	0.9954	0.7991	0.0160
N26	0.0011	0.9883	0.0021	0.0000
XY19	−0.3832	0.6050	0.5080	0.1430
COS	0.0008	0.9860	0.0009	0.0000
SK1-2D	−0.7594	0.8745	0.7993	0.6446
SK2-2D	−0.7543	0.7624	0.7327	0.5116
SK3-2D	−0.7410	0.6101	0.5450	0.2992
SK4-2D	−0.7574	0.7929	0.7623	0.5559
XVB-0-0.05	−0.6674	0.7550	0.7045	0.4311
XVB-0-0.1	−0.5599	0.8770	0.8428	0.5026
XVBr-1-10	−0.7516	0.9457	0.7676	0.6626
XVBr-0.5-10	−0.7876	0.8907	0.8468	0.7214
XVBr-0-10	−0.7580	0.7959	0.7659	0.5612
XVBr-1-5	−0.7943	0.8970	0.8516	0.7368
XVBr-0.5-5	−0.7943	0.8970	0.8516	0.7368
XVBr-0-5	−0.7668	0.7498	0.7327	0.5115
XVBr-1	−0.7516	0.8177	0.7704	0.5749
XVBr-0.5	−0.8171	0.8992	0.8873	0.7916
XVBr-0	−0.7753	0.9231	0.8183	0.7112
AoD	−0.9005	0.9446	0.9682	1.0000

2.1 Charts



(a) AoD (b) VB-0.5 (c) H3D (d) E-3D

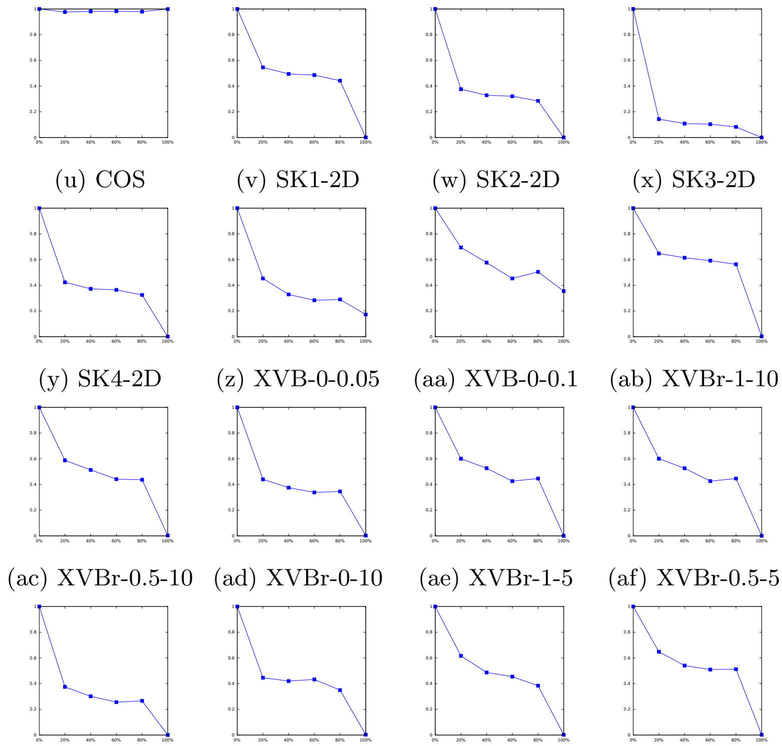
(e) GGeo-3D-2 (f) GGeo-3D-1 (g) GGeo-3D-4 (h) X17-2

(i) X17-0.5 (j) X19 (k) X21 (l) CC

(m) Ch (n) HK (o) HY15 (p) HY16

(q) BA-1-2 (r) BA-2-4 (s) N26 (t) XY19

Figure 1: Averages of the similarity levels per scenario versus the percentage of opposites included in each scenario (Part 1).



(u) COS (v) SK1-2D (w) SK2-2D (x) SK3-2D

(y) SK4-2D (z) XVB-0-0.05 (aa) XVB-0-0.1 (ab) XVBr-1-10

(ac) XVBr-0.5-10 (ad) XVBr-0-10 (ae) XVBr-1-5 (af) XVBr-0.5-5

(ag) XVBr-0-5 (ah) XVBr-1 (ai) XVBr-0.5 (aj) XVBr-0

Figure 1: Averages of the similarity levels per scenario versus the percentage of opposites included in each scenario (Part 2).

2.2 Linear models

References

[1] Loor, M., De Tré, G.: In a Quest for Suitable Similarity Measures to Compare Experience-Based Evaluations. In: Computational Intelligence: International Joint Conference, IJCCI 2015 Lisbon, Portugal, November 12-14, 2015, Revised Selected Papers pp. 291-314 (2017)

[2] M. Loor and G. De Tré, "Vector Based Similarity Measure for Intuitionistic Fuzzy Sets," in *Modern Approaches in Fuzzy Sets, Intuitionistic Fuzzy Sets, Generalized Nets and Related Topics : Volume I: Foundations*, K. T. Atanassov, M. Baczyński, J. Drewniak, J. Kacprzyk, M. Krawczak, E. Szmidt, M. Wygralak, and S. Zadrożny, Eds. SRI-PAS, 2014, pp. 105–127.

[3] E. Szmidt and J. Kacprzyk, "Distances between intuitionistic fuzzy sets," *Fuzzy Sets and Systems*, vol. 114, no. 3, pp. 505–518, Sep. 2000.

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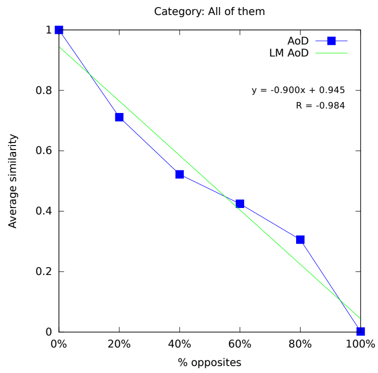

Figure 2: AoD - Linear model

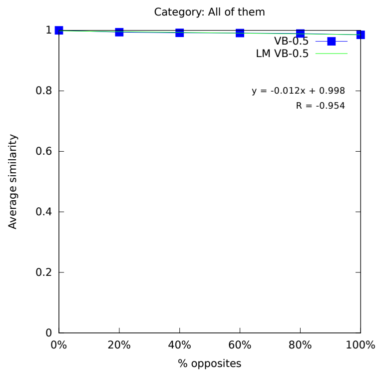

Figure 3: VB-0.5 - Linear model

[5] S.-M. Chen, S.-H. Cheng, and T.-C. Lan, "A novel similarity measure between intuitionistic fuzzy sets based on the centroid points of transformed fuzzy numbers with applications to pattern recognition," *Information Sciences*, vol. 343–344, pp. 15 – 40, 2016.

[6] S.-M. Chen *et al.*, "Similarity measures between vague sets and between elements," *IEEE TRANSACTIONS ON SYSTEMS MAN AND CYBERNETICS PART B-CYBERNETICS*, vol. 27, no. 1, pp. 153–158, 1997.

[7] D. H. Hong and C. Kim, "A note on similarity measures between vague sets and between elements," *Information Sciences*, vol. 115, no. 1, pp. 83 – 96, 1999.

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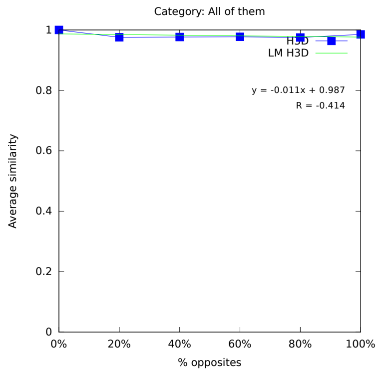

Figure 4: H3D - Linear model

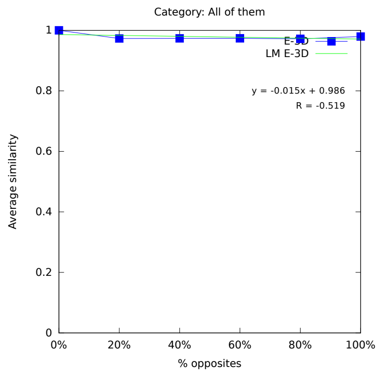

Figure 5: E-3D - Linear model

[10] H. Nguyen, "A novel similarity/dissimilarity measure for intuitionistic fuzzy sets and its application in pattern recognition," *Expert Systems with Applications*, vol. 45, pp. 97 – 107, 2016.

[11] Z. Xu and R. R. Yager, "Intuitionistic and interval-valued intutionistic fuzzy preference relations and their measures of similarity for the evaluation of agreement within a group," *Fuzzy Optimization and Decision Making*, vol. 8, no. 2, pp. 123–139, 2009.

[12] "Geometric similarity measures for the intuitionistic fuzzy sets," in *8th conference of the European Society for Fuzzy Logic and Technology (EUSFLAT-13)*. Atlantis Press, 2013, pp. 840–847.

[13] E. Szmidt and J. Kacprzyk, "A concept of similarity for intuitionistic fuzzy sets and its use in group decision making," in *IEEE International Conference on Fuzzy Systems*, 2004, pp. 1129–1134.

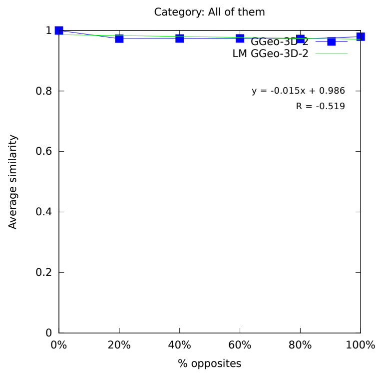

Figure 6: GGeo-3D-2 - Linear model

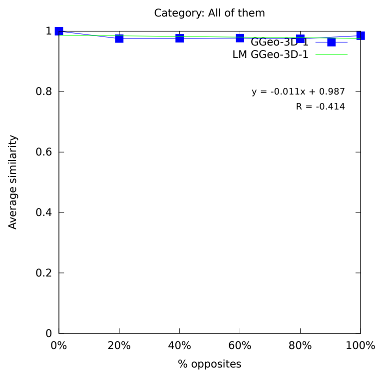

Figure 7: GGeo-3D-1 - Linear model

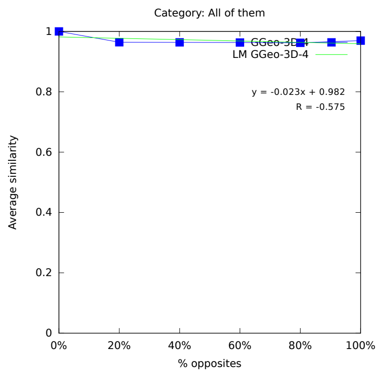

Figure 8: GGeo-3D-4 - Linear model

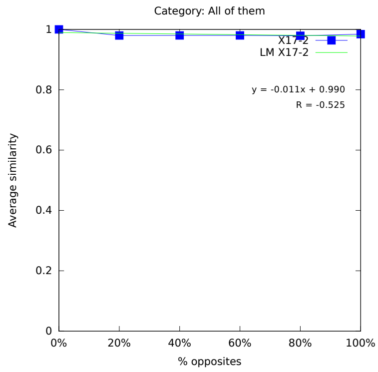

Figure 9: X17-2 - Linear model

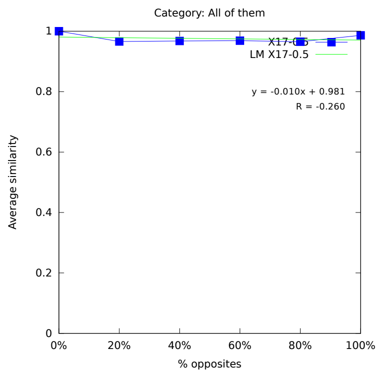

Figure 10: X17-0.5 - Linear model

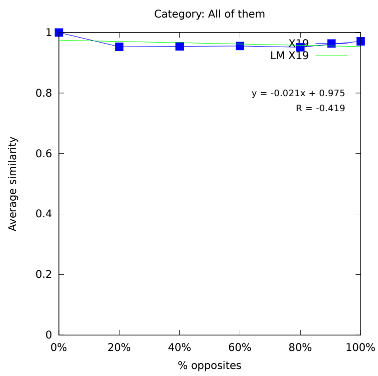

Figure 11: X19 - Linear model

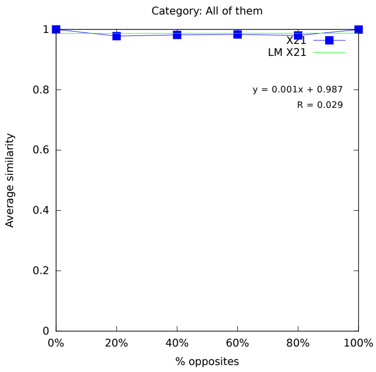

Figure 12: X21 - Linear model

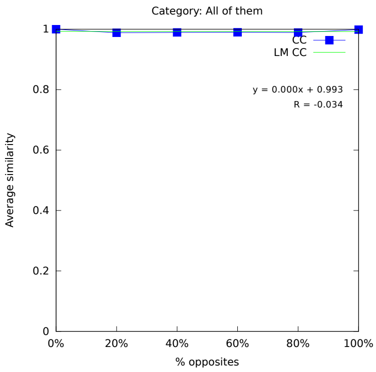

Figure 13: CC - Linear model

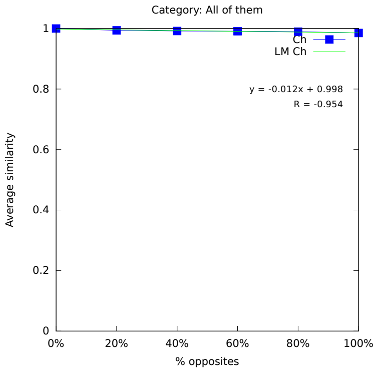

Figure 14: Ch - Linear model

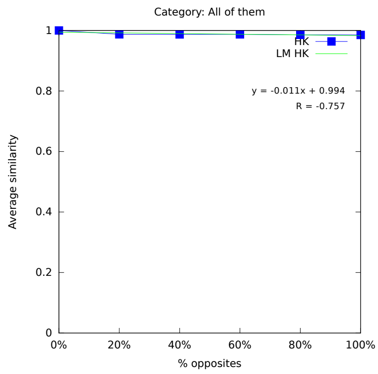

Figure 15: HK - Linear model

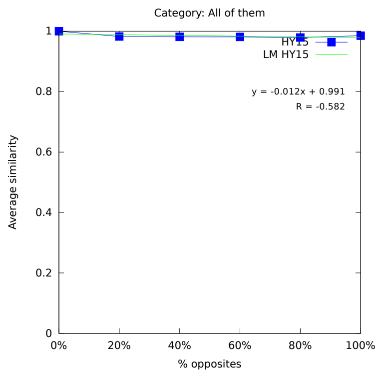

Figure 16: HY15 - Linear model

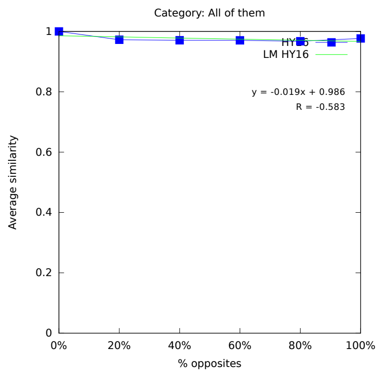

Figure 17: HY16 - Linear model

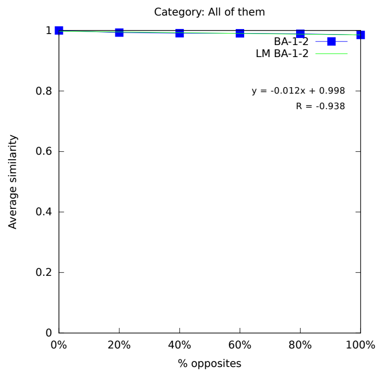

Figure 18: BA-1-2 - Linear model

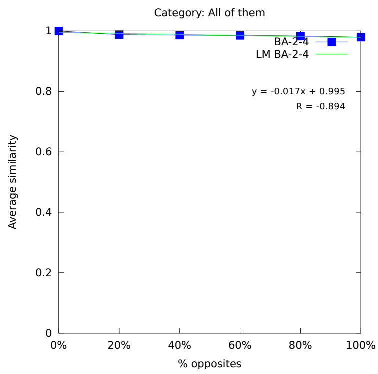

Figure 19: BA-2-4 - Linear model

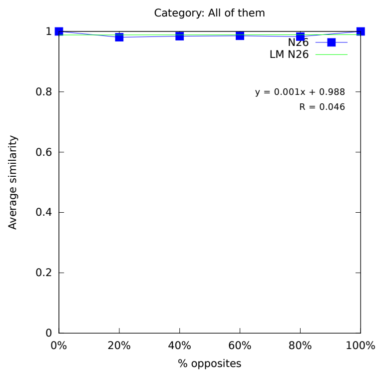

Figure 20: N26 - Linear model

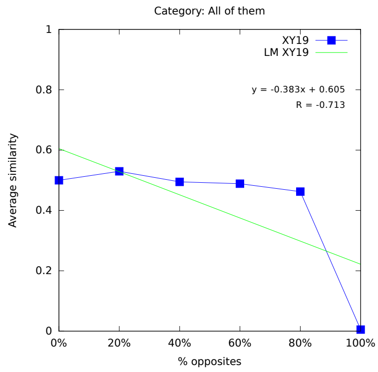

Figure 21: XY19 - Linear model

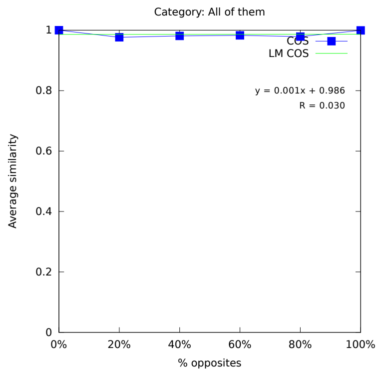

Figure 22: COS - Linear model

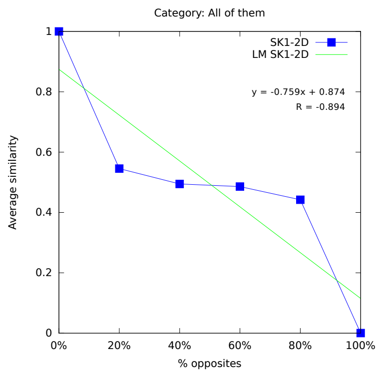

Figure 23: SK1-2D - Linear model

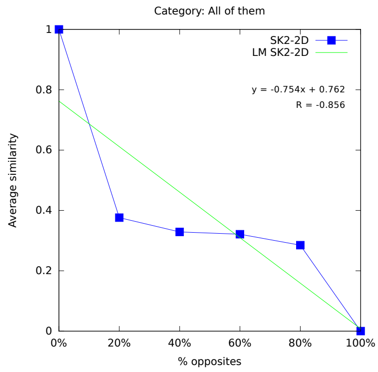

Figure 24: SK2-2D - Linear model

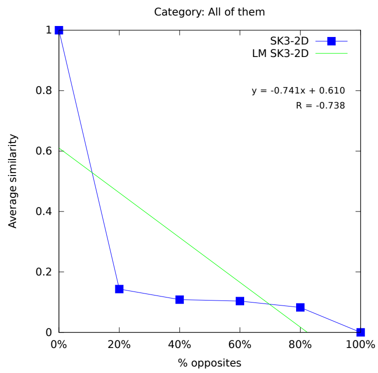

Figure 25: SK3-2D - Linear model

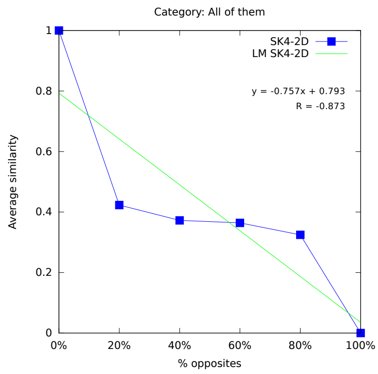

Figure 26: SK4-2D - Linear model

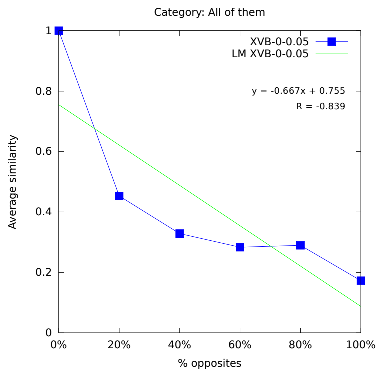

Figure 27: XVB-0-0.05 - Linear model

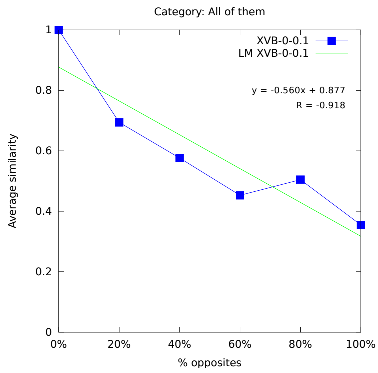

Figure 28: XVB-0-0.1 - Linear model

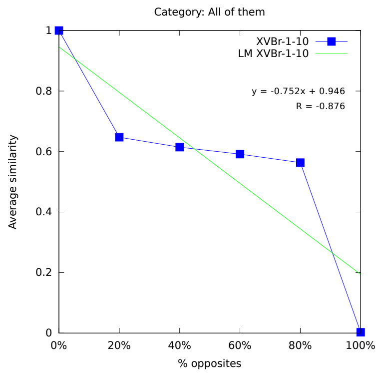

Figure 29: XVBr-1-10 - Linear model

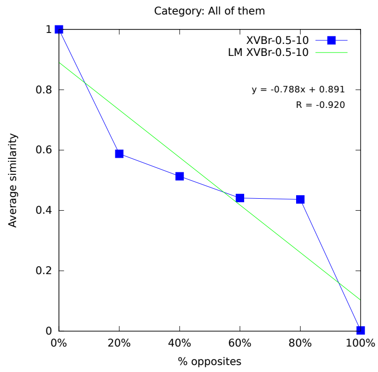

Figure 30: XVBr-0.5-10 - Linear model

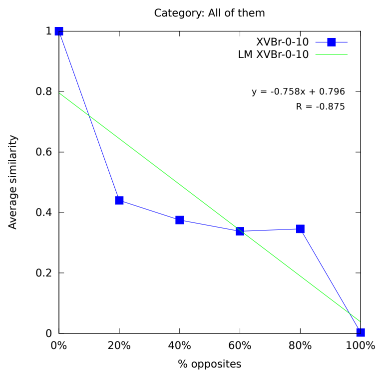

Figure 31: XVBr-0-10 - Linear model

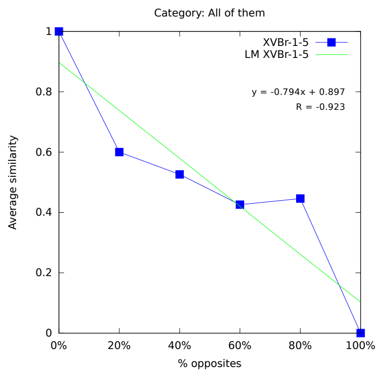

Figure 32: XVBr-1-5 - Linear model

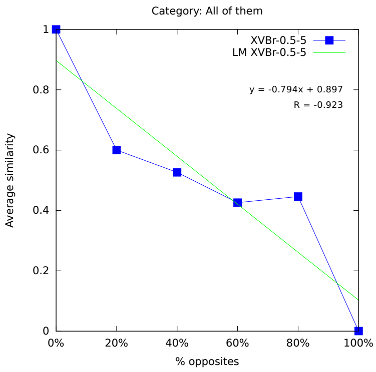

Figure 33: XVBr-0.5-5 - Linear model

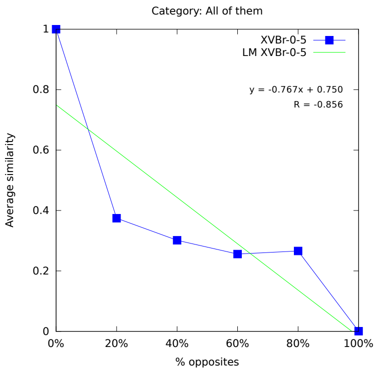

Figure 34: XVBr-0-5 - Linear model

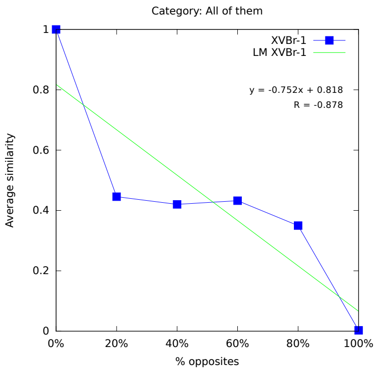

Figure 35: XVBr-1 - Linear model

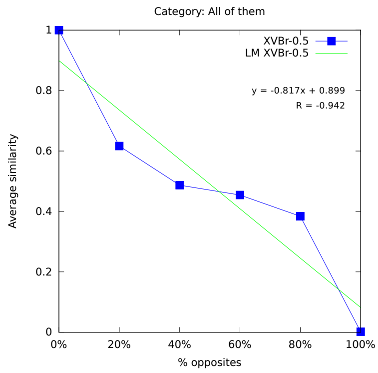

Figure 36: XVBr-0.5 - Linear model

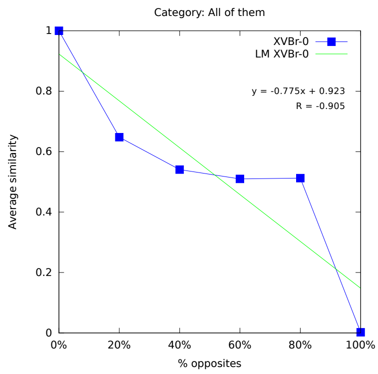

Figure 37: XVBr-0 - Linear model