

Figure 1 displays the results of running each algorithm on a set of different datasets. The figure shows a clear dominance of the evolutionary models across all datasets.

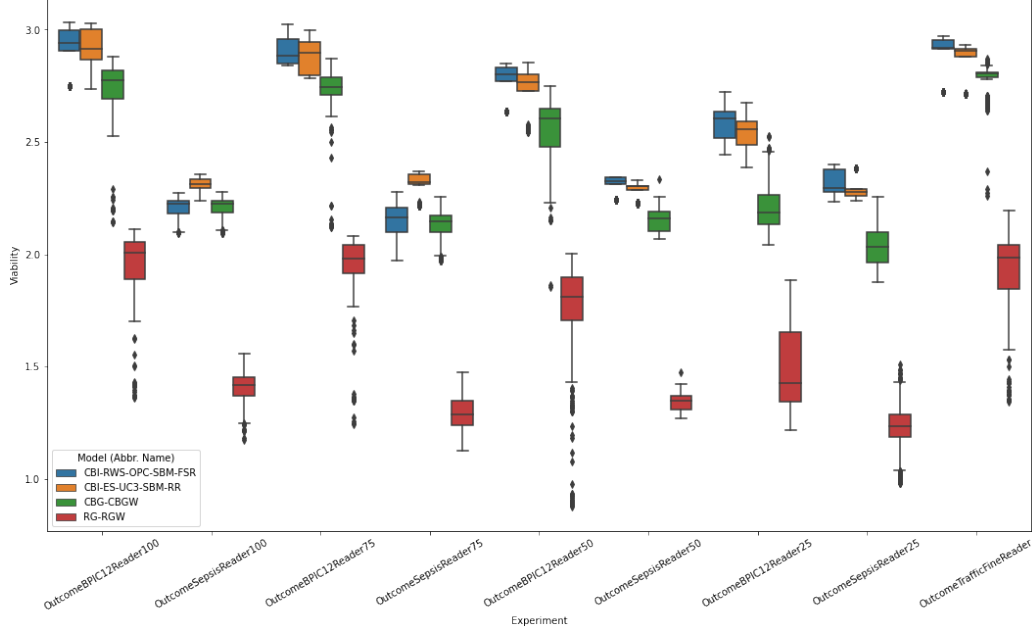


Figure 1: Boxplots of the viability of each model’s generated counterfactuals across a heterogeneous collection of datasets.

Here, *CBI-ES-UC3-SBM-RR* and *CBI-RWS-OPC-SBM-FSR* display a higher median of viability across all datasets. This is unsurprising as the evolutionary algorithm uses initiators based on the baselines. However, it is surprising that the evolutionary models consistently outperform the Casebased-Search Generator (green) across all datasets. In 6 out of 9 datasets, we see an improvement of at least 0.15. From ?? we see that the gap often occurs because of much higher similarity and sparsity scores. The highest median is reached for *CBI-RWS-OPC-SBM-FSR* at 2.94. The Random-Search Generator never manages to come even close to the case-based model. Except for the BPIC12-100 dataset, the Random-Search Generator has a median below 2.

In tables 1, 2, 3 and 4 we show generations of all models and compare them to DiCE4EL. We see that all models return reasonable counterfactuals, except the Random-Search Generator. This model does not seem to follow any pattern.

Factual Seq. Amount	Activity	Outcome	Resource	Our CF Seq. Amount	Activity	Outcome	Resource	DiCE4EL CF Seq. Activity	Resource	Amount
15 500	A-SUBMITTED	0	112							
15 500	A-PARTLYSUBMITTED	0	112							
15 500	A-PREACCEPTED	0	112							
15 500	W-Completeren aanvraag	0	112							
15 500	W-Completeren aanvraag	0	111							
15 500	W-Completeren aanvraag	0	889							
15 500	W-Completeren aanvraag	0	889							
15 500	W-Completeren aanvraag	0	9							
15 500	A-ACCEPTED	0	9							
15 500	A-FINALIZED	0	9	15 500	A-SUBMITTED	1	112			
15 500	O-SELECTED	0	9	15 500	A-PARTLYSUBMITTED	1	112			
15 500	O-CREATED	0	9	15 500	A-PREACCEPTED	1	112	A-SUBMITTED	112	15 500
15 500	O-SENT	0	9	15 500	W-Completeren aanvraag	1	111	A-PARTLYSUBMITTED	112	15 500
15 500	W-Completeren aanvraag	0	9	15 500	W-Completeren aanvraag	1	111	A-PREACCEPTED	112	15 500
15 500	W-Nabellen offertes	0	9	15 500	A-ACCEPTED	1	861	A-ACCEPTED	1	15 500
15 500	W-Nabellen offertes	0	9	15 500	A-FINALIZED	1	111	O-SELECTED	1	15 500
15 500	O-SENT-BACK	0	129	15 500	O-SELECTED	1	111	A-FINALIZED	1	15 500
15 500	W-Nabellen offertes	0	129	15 500	O-CREATED	1	111	O-CREATED	1	15 500
15 500	W-Valderen aanvraag	0	138	15 500	O-SENT	1	111	O-SENT	1	15 500
15 500	O-DECLINED	0	138	15 500	W-Completeren aanvraag	1	111	W-Completeren aanvraag	1	15 500
15 500	A-DECLINED	0	138	15 500	O-SENT-BACK	1	149	O-SENT-BACK	11259	15 500
15 500	W-Valderen aanvraag	0	138	15 500	W-Nabellen offertes	1	149	W-Nabellen offertes	11259	15 500
				15 500	O-ACCEPTED	1	629	O-ACCEPTED	9	15 500

Table 1: A comparison between the Casebased-Search Generator and D4EL

Factual Seq. Amount	Activity	Outcome	Resource	Our CF Seq. Amount	Activity	Outcome	Resource	DiCE4EL CF Seq. Activity	Resource	Amount
15 500	A-SUBMITTED	0	112							
15 500	A-PARTLYSUBMITTED	0	112							
15 500	A-PREACCEPTED	0	112							
15 500	W-Completeren aanvraag	0	112							
15 500	W-Completeren aanvraag	0	111							
15 500	W-Completeren aanvraag	0	889							
15 500	W-Completeren aanvraag	0	889							
15 500	W-Completeren aanvraag	0	9							
15 500	A-ACCEPTED	0	9	15 000	A-SUBMITTED	1	112			
15 500	A-FINALIZED	0	9	15 000	A-PARTLYSUBMITTED	1	112			
15 500	O-SELECTED	0	9	15 000	A-PREACCEPTED	1	112			
15 500	O-CREATED	0	9	15 000	A-ACCEPTED	1	861	A-SUBMITTED	112	15 500
15 500	O-SENT	0	9	15 000	A-FINALIZED	1	861	A-PARTLYSUBMITTED	112	15 500
15 500	W-Completeren aanvraag	0	9	15 000	O-SELECTED	1	861	A-PREACCEPTED	112	15 500
15 500	W-Nabellen offertes	0	9	15 000	O-CREATED	1	861	A-ACCEPTED	1	15 500
15 500	W-Nabellen offertes	0	9	15 000	O-SENT	1	861	O-SELECTED	1	15 500
15 500	O-SENT-BACK	0	129	15 000	W-Completeren aanvraag	1	861	A-FINALIZED	1	15 500
15 500	W-Nabellen offertes	0	129	5 000	W-Nabellen offertes	1	11189	O-CREATED	1	15 500
15 500	W-Valderen aanvraag	0	138	15 210	W-Nabellen offertes	1	861	O-SENT	1	15 500
15 500	O-DECLINED	0	138	15 000	O-SENT-BACK	1	129	W-Completeren aanvraag	1	15 500
15 500	A-DECLINED	0	138	15 363	W-Nabellen offertes	1	912	O-SENT-BACK	11259	15 500
15 500	W-Valderen aanvraag	0	138	14 537	W-Valderen aanvraag	1	129	W-Nabellen offertes	11259	15 500
				15 000	O-ACCEPTED	1	138	O-ACCEPTED	9	15 500

Table 2: A comparison between the CBI-ES-UC3-SBM-RR and D4EL

Factual Seq. Amount	Activity	Outcome	Resource	Our CF Seq. Amount	Activity	Outcome	Resource	DiCE4EL CF Seq. Activity	Resource	Amount
15 500	A-SUBMITTED	0	112							
15 500	A-PARTLYSUBMITTED	0	112							
15 500	A-PREACCEPTED	0	112							
15 500	W-Completeren aanvraag	0	112	5 000	A-SUBMITTED	1	112			
15 500	W-Completeren aanvraag	0	111	5 000	A-PARTLYSUBMITTED	1	112			
15 500	W-Completeren aanvraag	0	889	5 000	A-PREACCEPTED	1	112			
15 500	W-Completeren aanvraag	0	889	5 000	W-Completeren aanvraag	1	861			
15 500	W-Completeren aanvraag	0	9	7 500	W-Completeren aanvraag	1	861			
15 500	A-ACCEPTED	0	9	7 500	W-Completeren aanvraag	1	861			
15 500	A-FINALIZED	0	9	7 500	A-ACCEPTED	1	861			
15 500	O-SELECTED	0	9	7 500	A-FINALIZED	1	861			
15 500	O-CREATED	0	9	7 500	O-SELECTED	1	861	A-SUBMITTED	112	15 500
15 500	O-SENT	0	9	7 500	O-CREATED	1	861	A-PARTLYSUBMITTED	112	15 500
15 500	W-Completeren aanvraag	0	9	7 500	O-SENT	1	861	A-PREACCEPTED	112	15 500
15 500	W-Nabellen offertes	0	9	7 500	W-Completeren aanvraag	1	861	A-ACCEPTED	1	15 500
15 500	W-Nabellen offertes	0	9	7 500	W-Nabellen offertes	1	109	O-SELECTED	1	15 500
15 500	O-SENT-BACK	0	129	7 500	W-Nabellen offertes	1	861	A-FINALIZED	1	15 500
15 500	W-Nabellen offertes	0	129	7 500	O-SENT	1	789	O-CREATED	1	15 500
15 500	W-Valderen aanvraag	0	138	7 500	O-SENT-BACK	1	789	O-SENT	1	15 500
15 500	O-DECLINED	0	138	7 500	W-Nabellen offertes	1	789	W-Completeren aanvraag	1	15 500
15 500	A-DECLINED	0	138	5 000	W-Valderen aanvraag	1	138	O-SENT-BACK	11259	15 500
15 500	W-Valderen aanvraag	0	138	7 500	O-ACCEPTED	1	11289	W-Nabellen offertes	11259	15 500
								O-ACCEPTED	9	15 500

Table 3: A comparison between the CBI-RWS-OPC-SBM-FSR and D4EL

Factual Seq. Amount	Activity	Outcome	Resource	Our CF Seq. Amount	Activity	Outcome	Resource	DiCE4EL CF Seq. Activity	Resource	Amount
				11 247	A-PARTLYSUBMITTED	1				
				10 159	A-FINALIZED	1				
				13 939	O-SENT	1				
15 500	A-SUBMITTED	0	112	10 550	A-APPROVED	1				
15 500	A-PARTLYSUBMITTED	0	112	25 608	A-APPROVED	1				
15 500	A-PREACCEPTED	0	112	29 560	W-Nabellen offertes	1				
15 500	W-Completeren aanvraag	0	112	4 665	O-CANCELLED	1				
15 500	W-Completeren aanvraag	0	111	19 918	O-SELECTED	1				
15 500	W-Completeren aanvraag	0	889	16 922	W-Completeren aanvraag	1				
15 500	W-Completeren aanvraag	0	889							
15 500	W-Completeren aanvraag	0	9	19 969	A-SUBMITTED	1				
15 500	A-ACCEPTED	0	9	13 066	A-PREACCEPTED	1				
15 500	A-FINALIZED	0	9							
15 500	O-SELECTED	0	9	25 535	A-DECLINED	1				
15 500	O-CREATED	0	9					A-SUBMITTED	112	15 500
15 500	O-SENT	0	9	21 437	O-CREATED	1		A-PARTLYSUBMITTED	112	15 500
15 500	W-Completeren aanvraag	0	9	17 469	W-Beoordelen fraude	1		A-PREACCEPTED	112	15 500
15 500	W-Nabellen offertes	0	9					A-ACCEPTED	1	15 500
15 500	W-Nabellen offertes	0	9	29 395	W-Completeren aanvraag	1		O-SELECTED	1	15 500
15 500	O-SENT-BACK	0	129	9 053	O-SENT-BACK	1		A-FINALIZED	1	15 500
15 500	W-Nabellen offertes	0	129					O-CREATED	1	15 500
15 500	W-Valideren aanvraag	0	138	11 627	A-FINALIZED	1		O-SENT	1	15 500
15 500	O-DECLINED	0	138	41 470	W-Valideren aanvraag	1		W-Completeren aanvraag	1	15 500
15 500	A-DECLINED	0	138	16 381	O-SENT-BACK	1		O-SENT-BACK	11259	15 500
15 500	W-Valideren aanvraag	0	138	2 828	A-ACCEPTED	1		W-Nabellen offertes	11259	15 500
				8 834	O-ACCEPTED	1		O-ACCEPTED	9	15 500

Table 4: A comparison between the Random-Search Generator and D4EL