

▼ 1 Investigating Hybrid Strategies for Systematic Literature Review

Experiment 3

Study

On the use of ontologies in software process assessment: a systematic literature review

Tarhan, Ayça and Giray, Gorkem

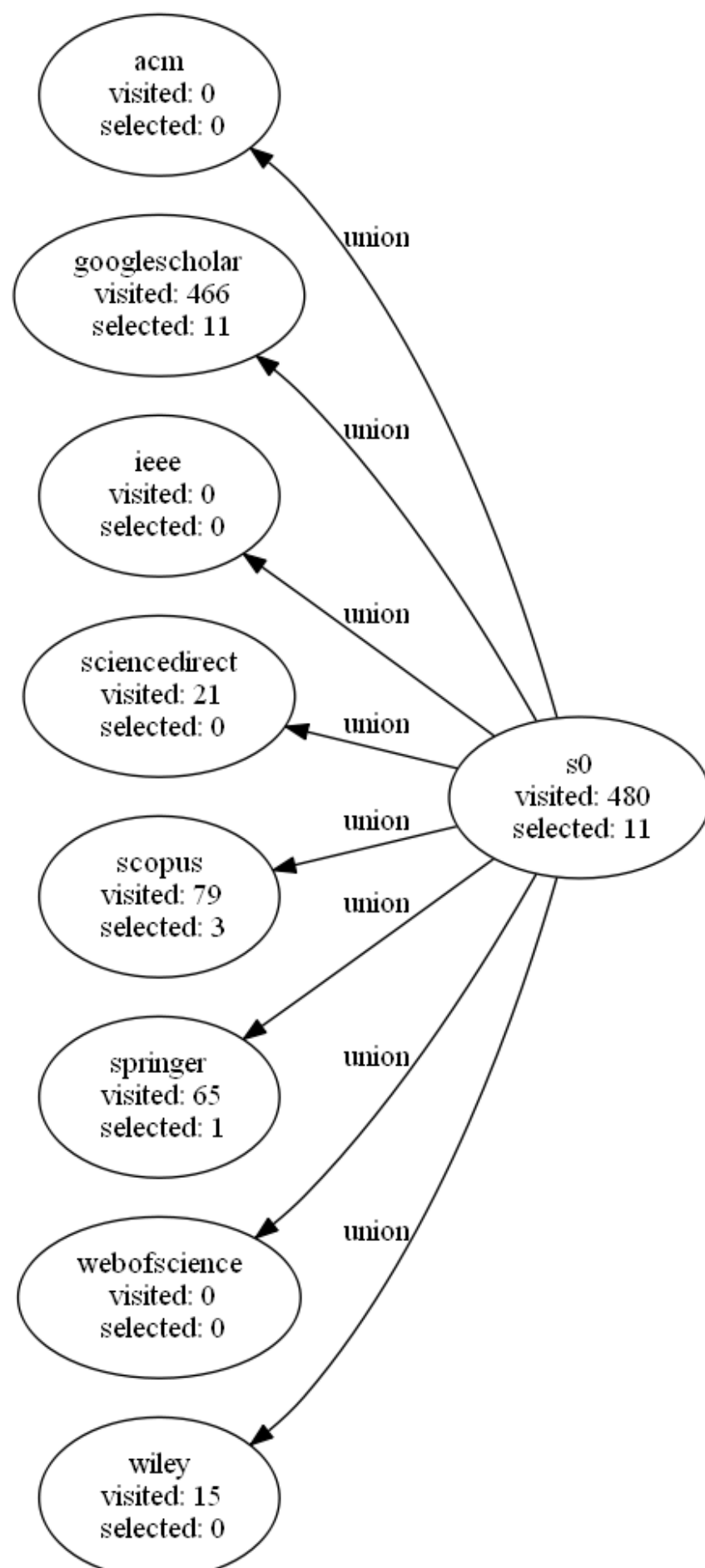
21st International Conference on Evaluation and Assessment in Software Engineering, EASE 2017

▼ 2 Strategies

▼ 2.1 Strategy 1 - Database Search (Search)

Total of selected studies = 11 (Seed Set) + 3 (Snowballing) = 14

Provenance Graph - Strategy 1 - Database Search (Search)



Report Strategy 1 - Database Search (Search)

Total of selected studies in the SLR = 14

Precision = Selected/ Visited

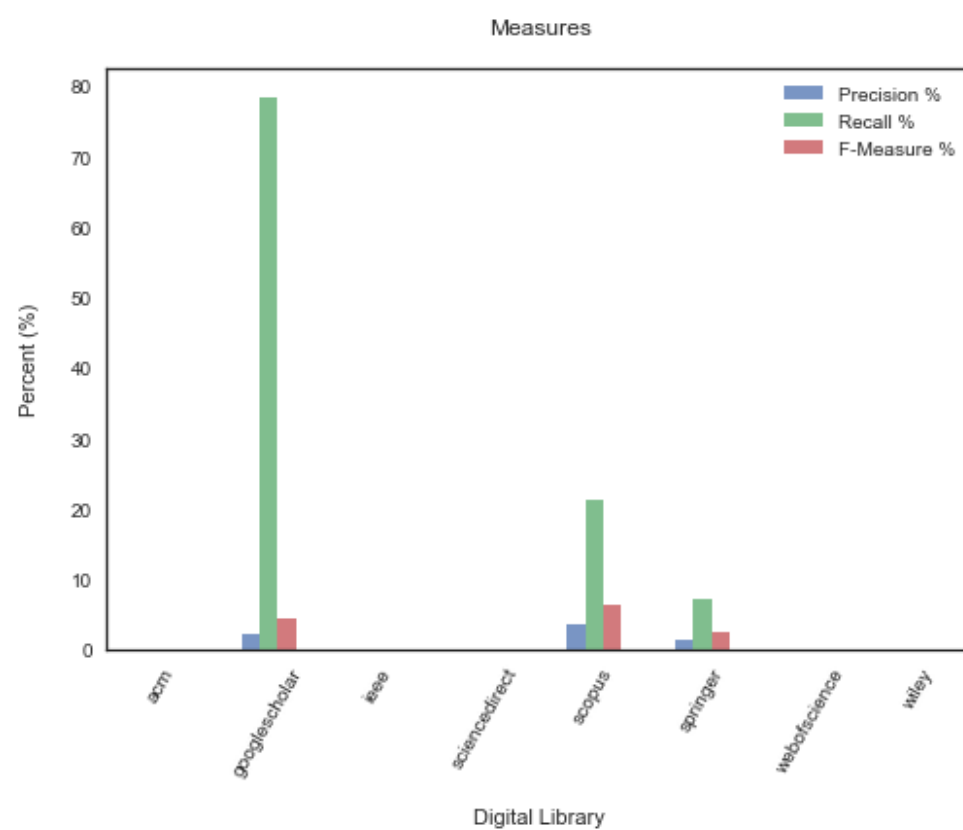
Recall = Selected/ Total of selected studies in the SLR

F-Measure = Harmonic Mean of Precision and Recall

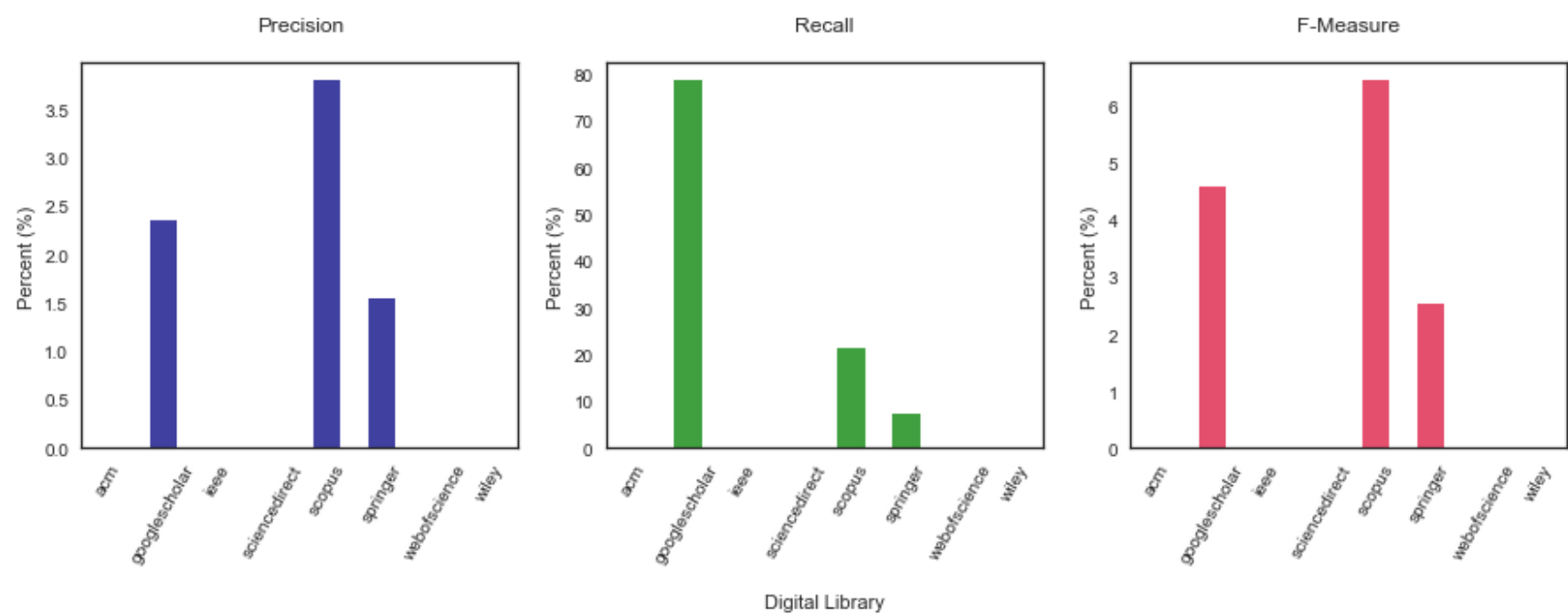
Out[9]:

Digital Library	Visited	Selected	Precision %	Recall %	F-Measure %
acm	0	0	nan	0.00	0.00
googlescholar	466	11	2.36	78.57	4.58
ieee	0	0	nan	0.00	0.00
sciencedirect	21	0	0.00	0.00	0.00
scopus	79	3	3.80	21.43	6.45
springer	65	1	1.54	7.14	2.53
webofscience	0	0	nan	0.00	0.00
wiley	15	0	0.00	0.00	0.00

Bar Chart Strategy 1



Bar Chart Strategy 1



Report Strategy 1 - Measures of Strategy - Union of all digital libraries (accumulated)

Out[16]:

Strategy	Visited	Selected	Precision %	Recall %	F-Measure %
Search	480	11	2.29	78.57	4.45

Report Strategy 1 - Total of papers retrieved from Excel and Duplicates.

Visited = Excel + Duplicates

Selected = Papers selected in the SLR

Excel = Papers retrieved from Excel provided by authors

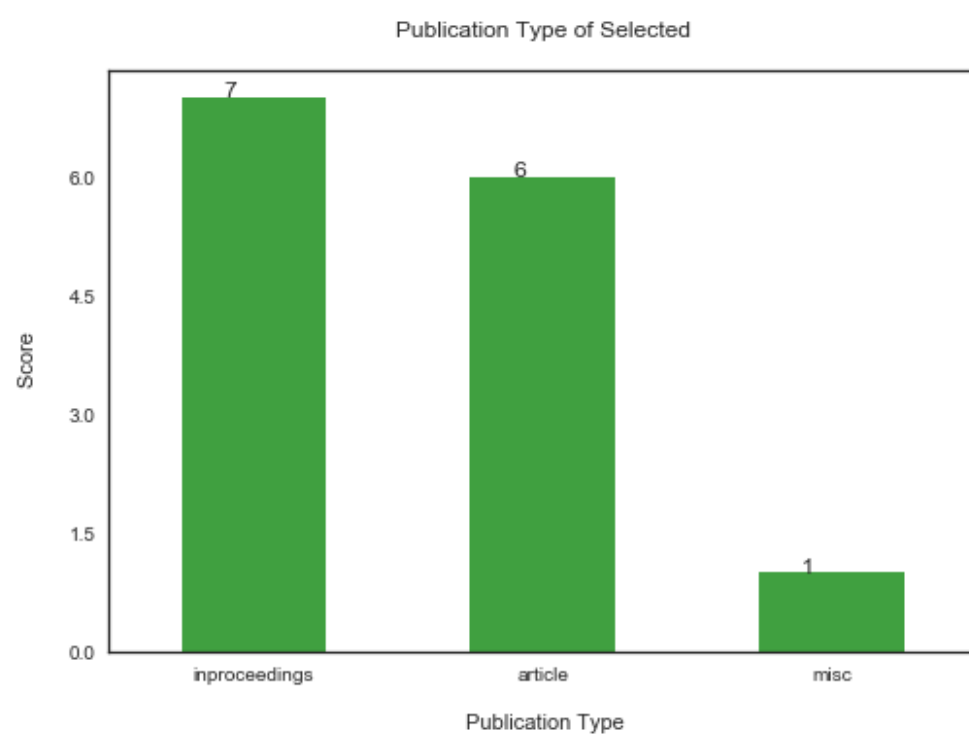
Excel Selected = Papers selected in the SLR and retrieved from Excel provided by authors

Duplicated = Papers identified as duplicate

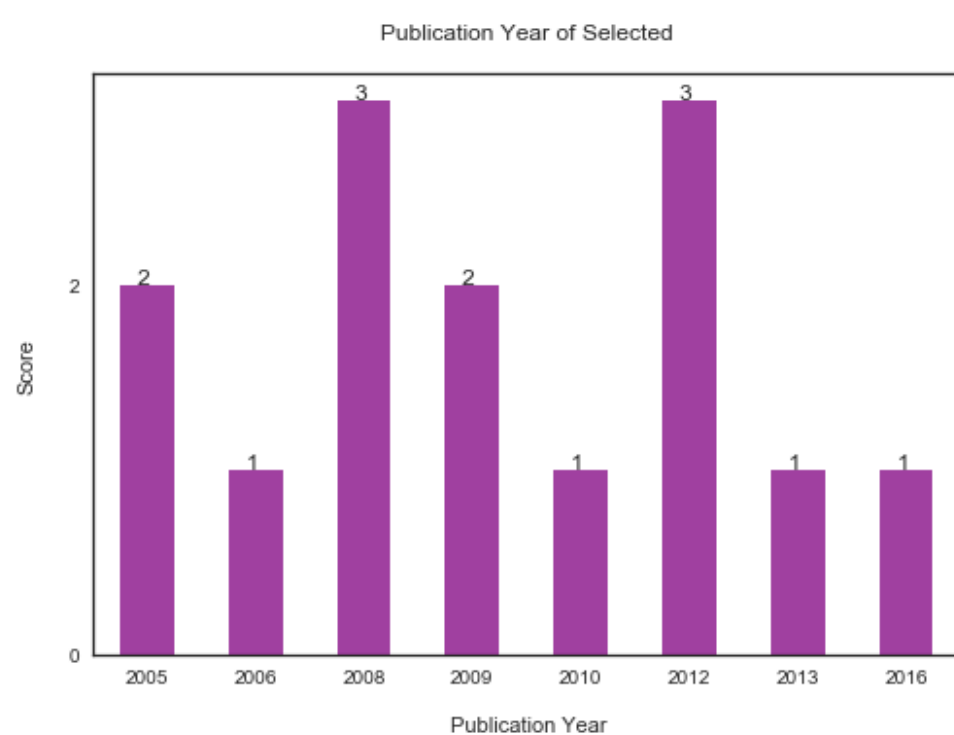
Out[17]:

Digital Library	Visited	Selected	Excel	Excel Selected	Duplicated
acm	0	0	0	0	0
googlescholar	466	11	466	11	0
ieee	0	0	0	0	0
sciencedirect	21	0	21	0	0
scopus	79	3	2	1	77
springer	65	1	65	1	0
webofscience	0	0	0	0	0
wiley	15	0	15	0	0

Bar Chart Publications Type - Strategy 1



Bar Chart Publications Year - Strategy 1



Report Strategy 1 - Seed Set of each Digital Library - Intersection

[illegible]

[illegible]

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'googlescholar & sciencedirect & springer & wiley': [],
'googlescholar & sciencedirect & webofscience': [],
'googlescholar & sciencedirect & webofscience & wiley': [],
'googlescholar & sciencedirect & wiley': [],
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'googlescholar & scopus & wiley': [],
'googlescholar & springer': ['rungratri2008a'],
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'wiley': []}

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Report Strategy 1 - Seed Set

Out[21]: 11

Report Strategy 1 - Unique in the intersection

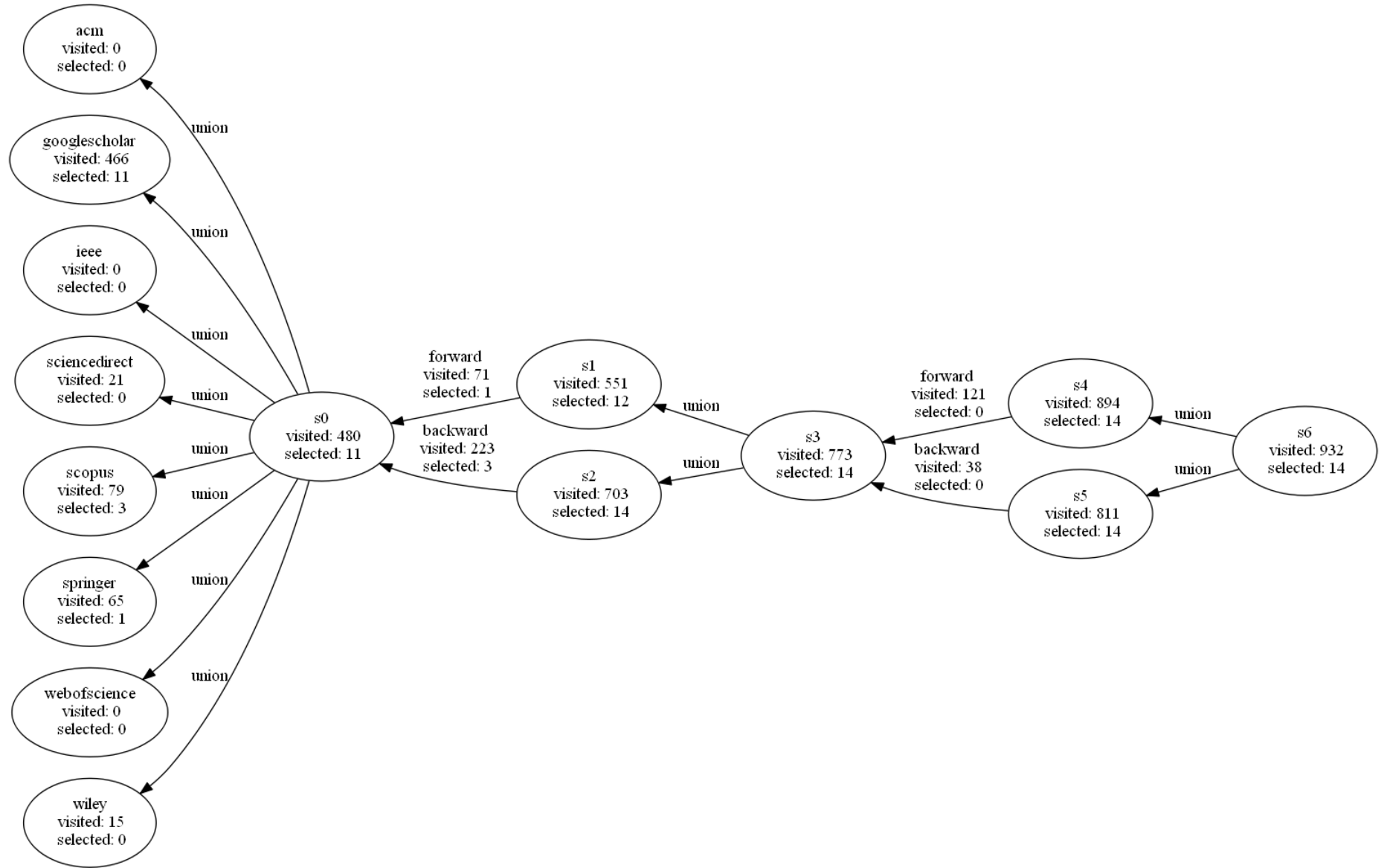
Out[22]: 7

Report Strategy 1 - Empty set

Out[23]: ['acm', 'ieee', 'sciencedirect', 'scopus', 'springer', 'webofscience', 'wiley']

▼ 2.2 Strategy 2 - Database Search + Snowballing of Wohlin Guideline (Search + SB)

Provenance Graph - Strategy 2 - Database Search + Snowballing of Wohlin Guideline (Search + SB)



Report Strategy 2 - Database Search + Snowballing of Wohlin Guideline (Search + SB)

Total of selected studies in the SLR = 14

Precision = Selected/ Visited

Recall = Selected/ Total of selected studies in the SLR

F-Measure = Harmonic Mean of Precision and Recall

Out[26]:

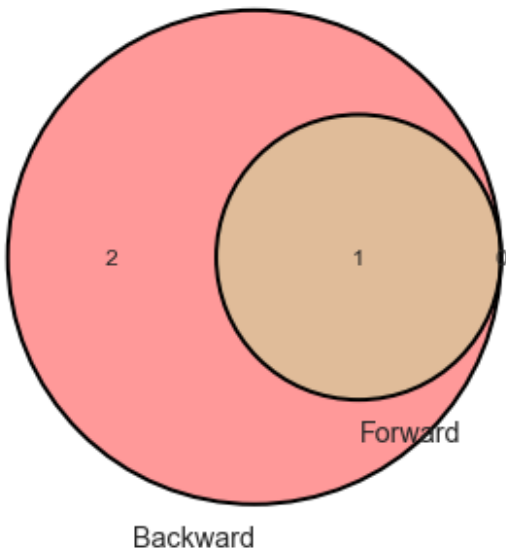
Digital Library/State	Delta Visited	Delta Selected	Delta Precision%	Delta Recall%	Delta F_Measure%	Operation	Accumulated Visited	Accumulated Selected	Accumulated Precision%	Accumulated Recall%	Accumulated F_Measure%
acm	0	0	nan	0.00	0.00	-	0	0	2.29	0.00	0.00
googlescholar	466	11	2.36	78.57	4.58	-	466	11	2.36	78.57	4.58
ieee	0	0	nan	0.00	0.00	-	0	0	2.36	0.00	0.00
sciencedirect	21	0	0.00	0.00	0.00	-	21	0	0.00	0.00	0.00
scopus	79	3	3.80	21.43	6.45	-	79	3	3.80	21.43	6.45
springer	65	1	1.54	7.14	2.53	-	65	1	1.54	7.14	2.53
webofscience	0	0	nan	0.00	0.00	-	0	0	1.54	0.00	0.00
wiley	15	0	0.00	0.00	0.00	-	15	0	0.00	0.00	0.00
s0	0	0	nan	0.00	0.00	union	480	11	2.29	78.57	4.45
s1	71	1	1.41	7.14	2.35	forward	551	12	2.18	85.71	4.25
s2	223	3	1.35	21.43	2.53	backward	703	14	1.99	100.00	3.91
s3	0	0	nan	0.00	0.00	union	773	14	1.81	100.00	3.56
s4	121	0	0.00	0.00	0.00	forward	894	14	1.57	100.00	3.08
s5	38	0	0.00	0.00	0.00	backward	811	14	1.73	100.00	3.39
s6	0	0	nan	0.00	0.00	union	932	14	1.50	100.00	2.96

Report Strategy 2 - Measures of Strategy (accumulated)

Out[27]:

Strategy	Visited	Selected	Precision %	Recall %	F-Measure %
Search + SB	932	14	1.50	100.00	2.96

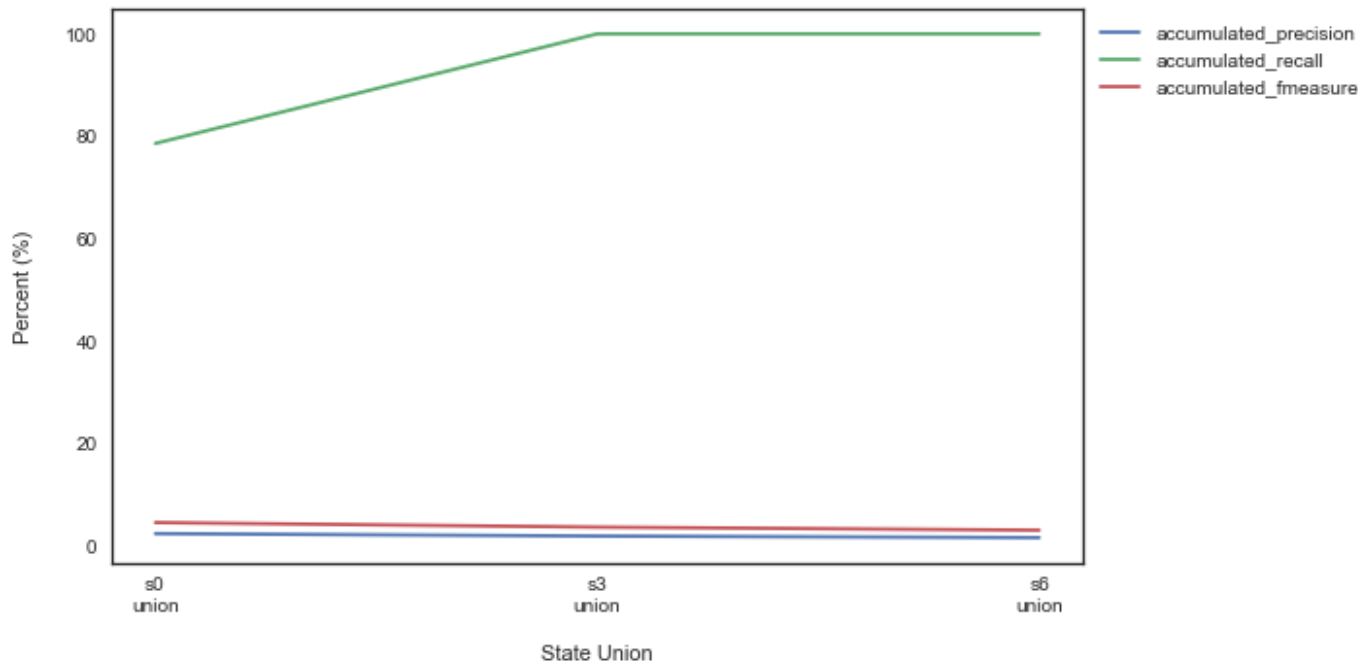
Diagrama de Venn - Strategy 2



Report Diagrama de Venn

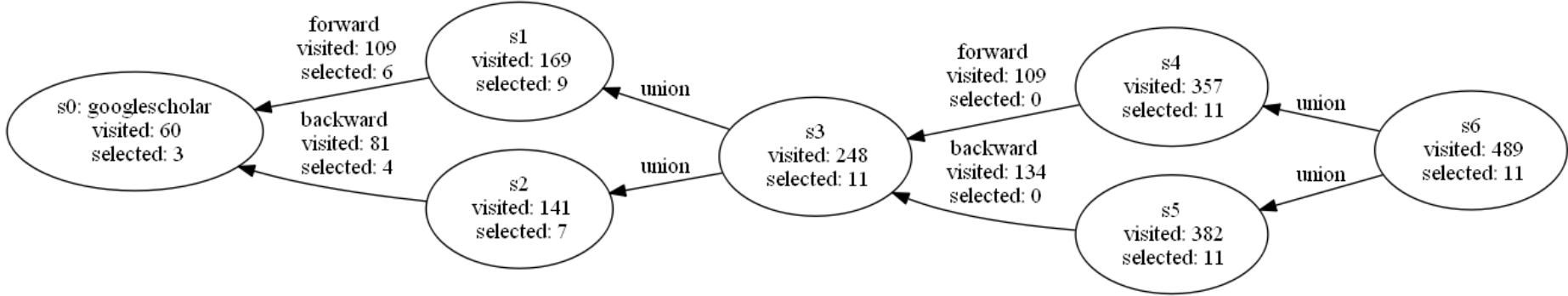
Backward ['lee2008a', 'lee2009a', 'soydan2006a']
Forward ['soydan2006a']

Accumulated Measures - Strategy 2



▼ 2.3 Strategy 3 - Informal Search (Google Scholar) + Snowballing of Wohlin Guideline = (GS + SB)

Provenance Graph - Strategy 3 - Informal Search (Google Scholar) + Snowballing of Wohlin Guideline = (GS + SB)



Report Strategy 3 - Informal Search in Google Scholar + Snowballing of Wohlin Guideline = (GS + SB)

Total of selected studies in the SLR = 14

Precision = Selected/ Visited
Recall = Selected/ Total of selected studies in the SLR
F-Measure = Harmonic Mean of Precision and Recall

Out[33]:

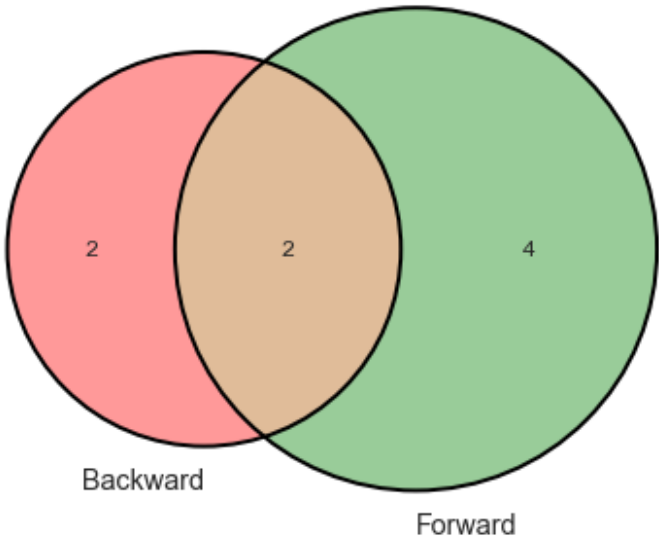
Scholar=s0 /State	Delta Visited	Delta Selected	Delta Precision%	Delta Recall%	Delta F_Measure%	Operation	Accumulated Visited	Accumulated Selected	Accumulated Precision%	Accumulated Recall%	Accumulated F_Measure%
s0: googlescholar	60	3	5.00	21.43	8.11	-	60	3	5.00	21.43	8.11
s1	109	6	5.50	42.86	9.76	forward	169	9	5.33	64.29	9.84
s2	81	4	4.94	28.57	8.42	backward	141	7	4.96	50.00	9.03
s3	0	0	nan	0.00	0.00	union	248	11	4.44	78.57	8.40
s4	109	0	0.00	0.00	0.00	forward	357	11	3.08	78.57	5.93
s5	134	0	0.00	0.00	0.00	backward	382	11	2.88	78.57	5.56
s6	0	0	nan	0.00	0.00	union	489	11	2.25	78.57	4.37

Report Strategy 3 - Measures of Strategy (accumulated)

Out[34]:

Strategy	Visited	Selected	Precision %	Recall %	F-Measure %
GS + SB	489	11	2.25	78.57	4.37

Diagrama de Venn - Strategy 3

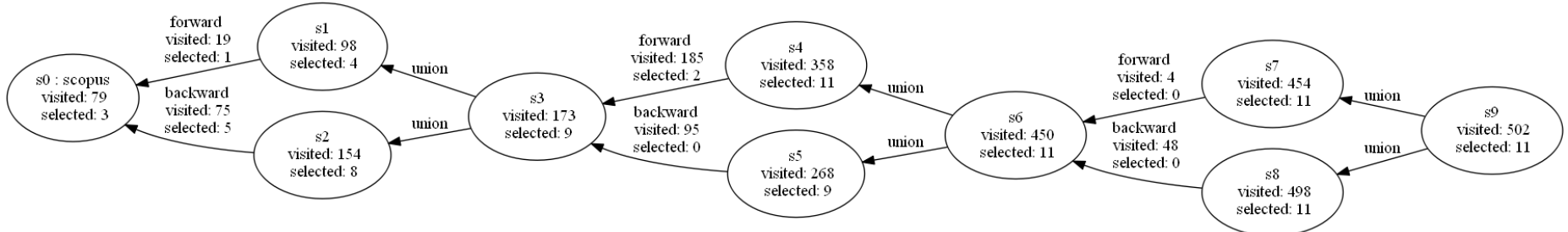


Report Diagrama de Venn

Backward ['lee2008a', 'rungratri2008a', 'gazel2009a', 'soydan2006a']
Forward ['grambow2013a', 'gazel2009a', 'grambow2012a', 'soydan2006a', 'ryu2008a', 'soydan2012a']

2.4 Strategy 4 - Scopus + Snowballing of Wohlin Guideline (Scopus + SB)

Provenance Graph - Strategy 4 - Scopus + Snowballing (Guideline Wohlin)



Report Strategy 4 - Scopus + Snowballing of Wohlin Guideline (Scopus + SB)

Total of selected studies in the SLR = 14

Precision = Selected/ Visited

Recall = Selected/ Total of selected studies in the SLR

F-Measure = Harmonic Mean of Precision and Recall

Out[39]:

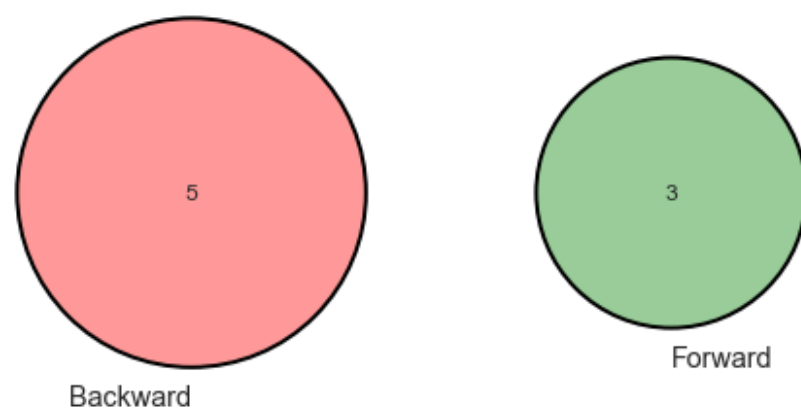
Scopus=s0 /State	Delta Visited	Delta Selected	Delta Precision%	Delta Recall%	Delta F_Measure%	Operation	Accumulated Visited	Accumulated Selected	Accumulated Precision%	Accumulated Recall%	Accumulated F_Measure%
s0 : scopus	79	3	3.80	21.43	6.45	-	79	3	3.80	21.43	6.45
s1	19	1	5.26	7.14	6.06	forward	98	4	4.08	28.57	7.14
s2	75	5	6.67	35.71	11.24	backward	154	8	5.19	57.14	9.52
s3	0	0	nan	0.00	0.00	union	173	9	5.20	64.29	9.63
s4	185	2	1.08	14.29	2.01	forward	358	11	3.07	78.57	5.91
s5	95	0	0.00	0.00	0.00	backward	268	9	3.36	64.29	6.38
s6	0	0	nan	0.00	0.00	union	450	11	2.44	78.57	4.74
s7	4	0	0.00	0.00	0.00	forward	454	11	2.42	78.57	4.70
s8	48	0	0.00	0.00	0.00	backward	498	11	2.21	78.57	4.30
s9	0	0	nan	0.00	0.00	union	502	11	2.19	78.57	4.26

Report Strategy 4 - Measures of Strategy (accumulated)

Out[40]:

Strategy	Visited	Selected	Precision %	Recall %	F-Measure %
Scopus + SB	502	11	2.19	78.57	4.26

Diagrama de Venn - Strategy 4



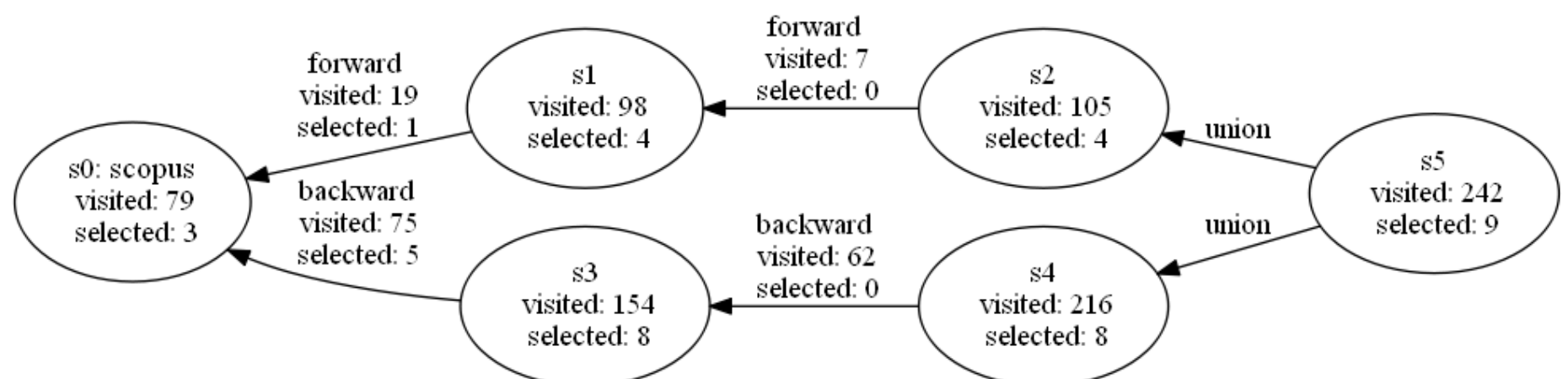
Report Diagrama de Venn

Backward ['soydan2006a', 'lee2009a', 'liao2005a', 'lee2008a', 'rungratri2008a']

Forward ['grambow2013a', 'soydan2012a', 'grambow2012a']

▼ 2.5 Strategy 5 - Scopus + Parallel Snowballing of Paper ESEM2017 (Scopus + BS // FS)

Provenance Graph - Strategy 5 - Scopus + Parallel Snowballing of Paper ESEM2017 (Scopus + BS // FS)



Report Strategy 5 - Scopus + Parallel Snowballing of Paper ESEM2017 (Scopus + BS // FS)

Total of selected studies in the SLR = 14

Precision = Selected/ Visited
Recall = Selected/ Total of selected studies in the SLR
F-Measure = Harmonic Mean of Precision and Recall

Out[45]:

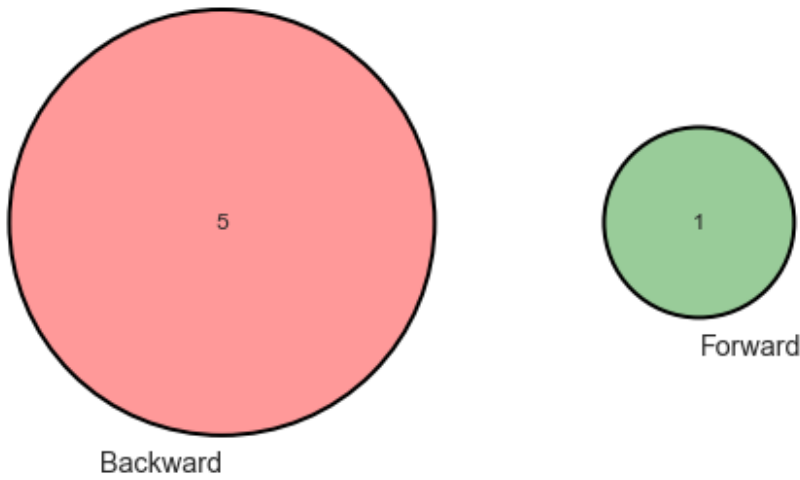
Scopus=s0 /State	Delta Visited	Delta Selected	Delta Precision%	Delta Recall%	Delta F_Measure%	Operation	Accumulated Visited	Accumulated Selected	Accumulated Precision%	Accumulated Recall%	Accumulated F_Measure%
s0: scopus	79	3	3.80	21.43	6.45	-	79	3	3.80	21.43	6.45
s1	19	1	5.26	7.14	6.06	forward	98	4	4.08	28.57	7.14
s2	7	0	0.00	0.00	0.00	forward	105	4	3.81	28.57	6.72
s3	75	5	6.67	35.71	11.24	backward	154	8	5.19	57.14	9.52
s4	62	0	0.00	0.00	0.00	backward	216	8	3.70	57.14	6.96
s5	0	0	nan	0.00	0.00	union	242	9	3.72	64.29	7.03

Report Strategy 5 - Measures of Strategy (accumulated)

Out[46]:

Strategy	Visited	Selected	Precision %	Recall %	F-Measure %
Scopus + BS // FS	242	9	3.72	64.29	7.03

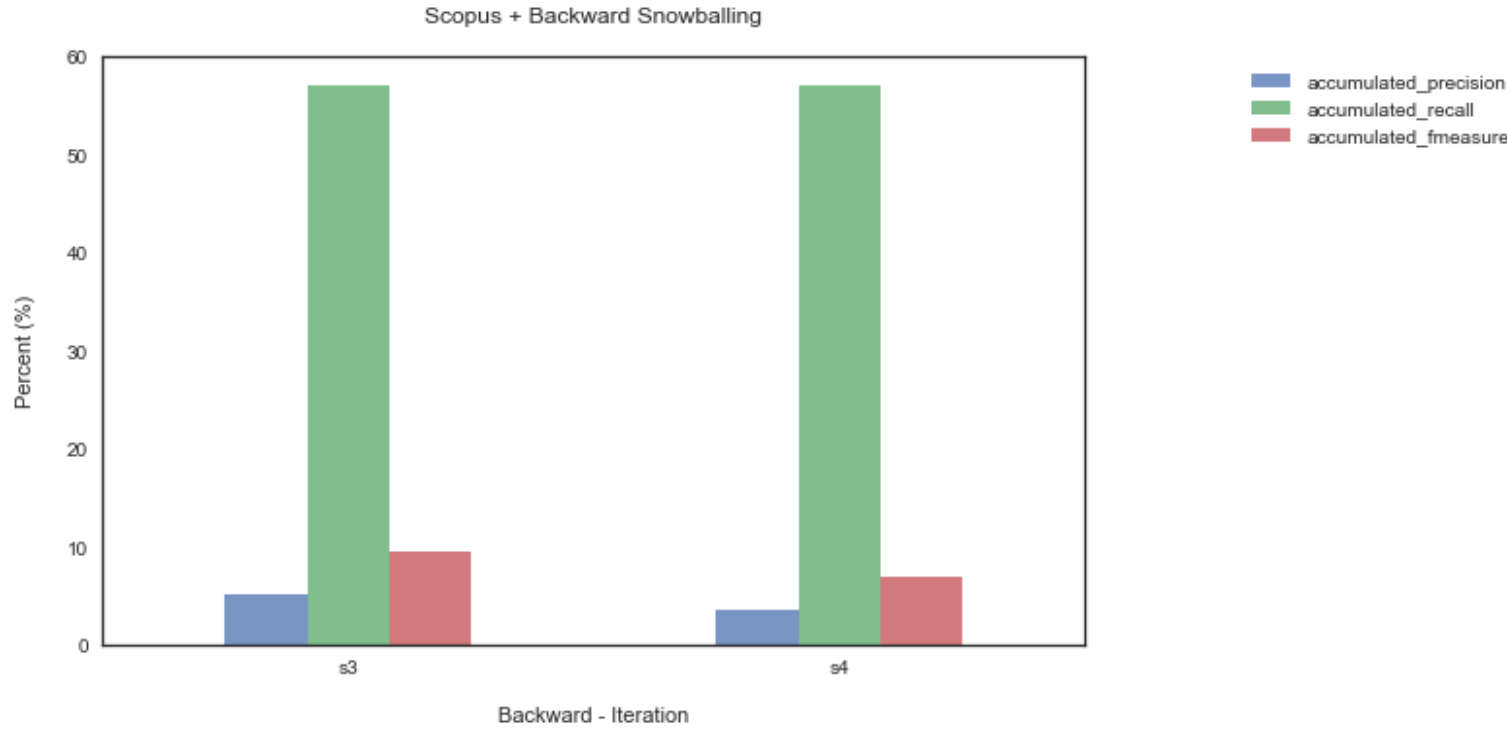
Diagrama de Venn - Strategy 5



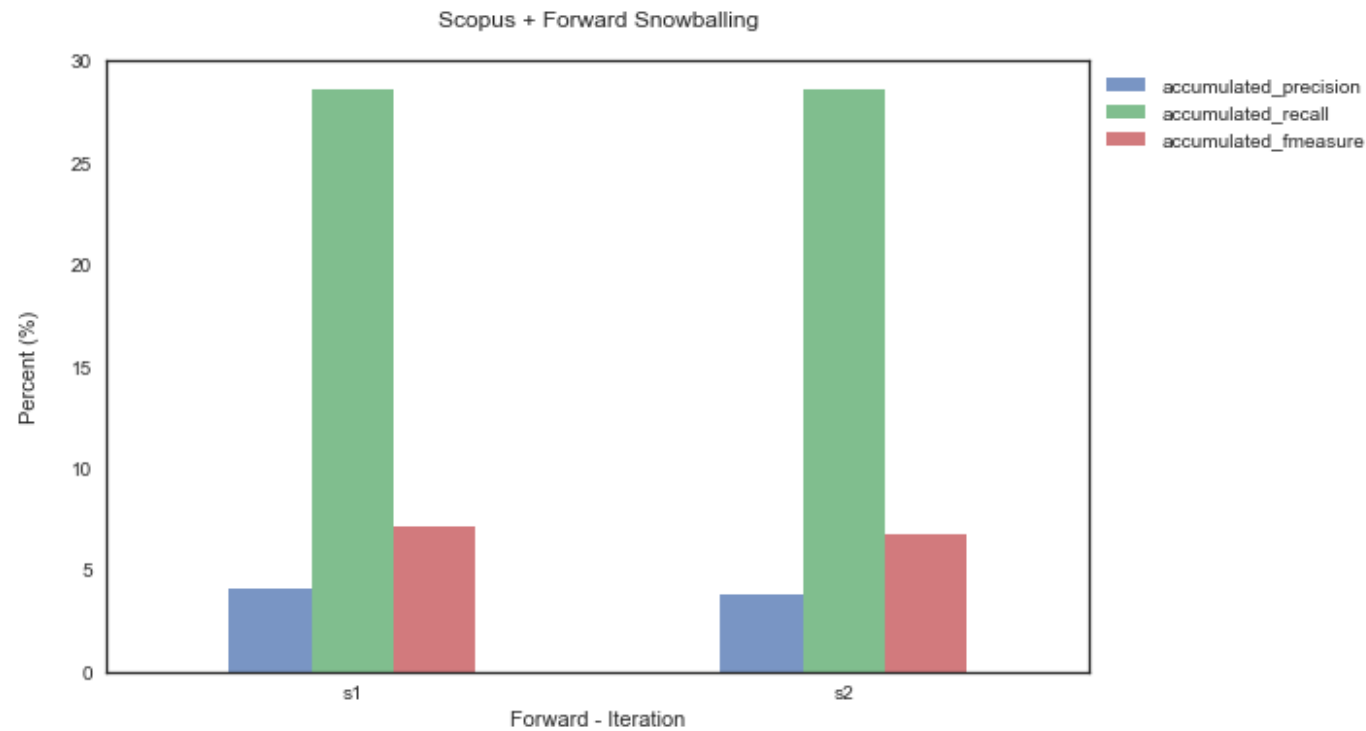
Report Diagrama de Venn

Backward ['soydan2006a', 'lee2009a', 'liao2005a', 'lee2008a', 'rungratri2008a']
Forward ['soydan2012a']

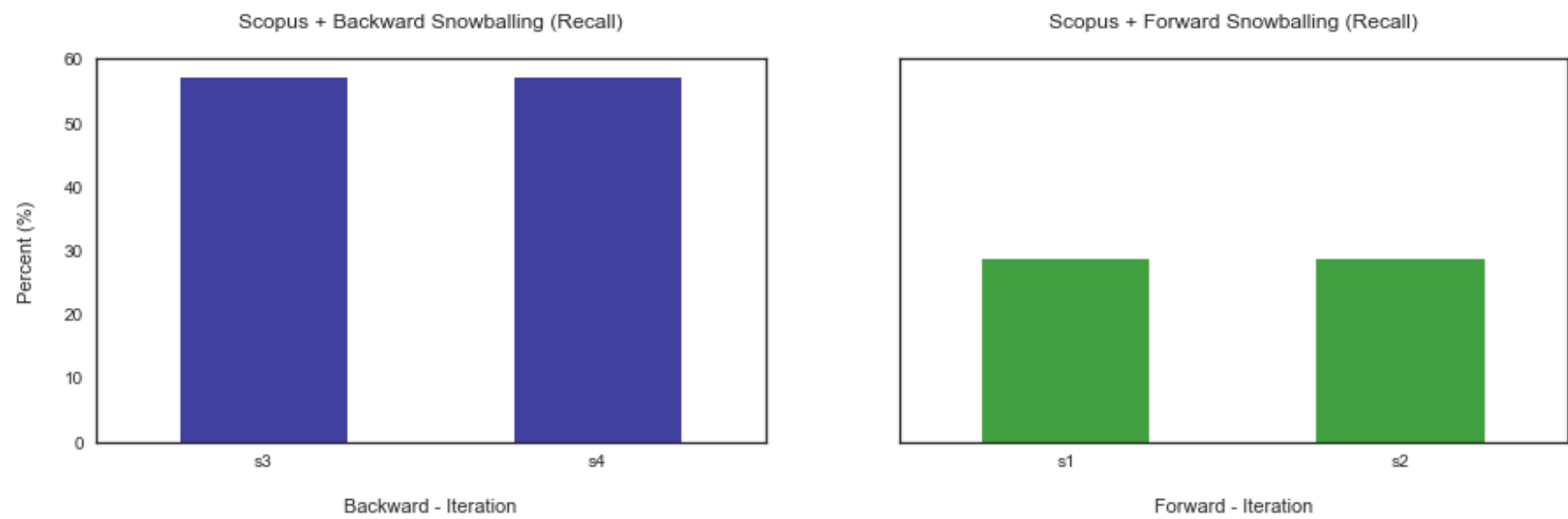
Bar Chart Strategy 5



Bar Chart Strategy 5

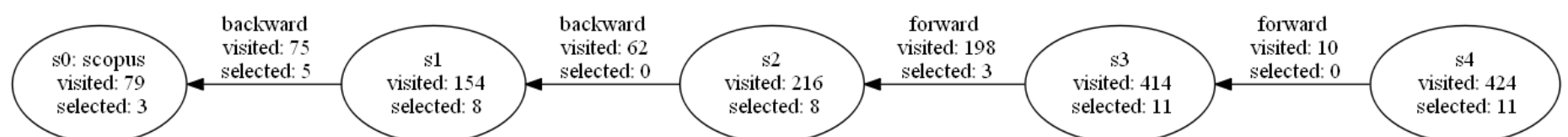


Bar Chart Strategy 5 (Scopus + BS // FS)



2.6 Strategy 6 - Scopus + Sequential Snowballing (Scopus + BS + FS)

Provenance Graph - Strategy 6 - Scopus + Sequential Snowballing (Scopus + BS + FS)



Report Strategy 6 - Scopus + Sequential Snowballing (Scopus + BS + FS)

Total of selected studies in the SLR = 14

Precision = Selected/ Visited

Recall = Selected/ Total of selected studies in the SLR

F-Measure = Harmonic Mean of Precision and Recall

Out[56]:

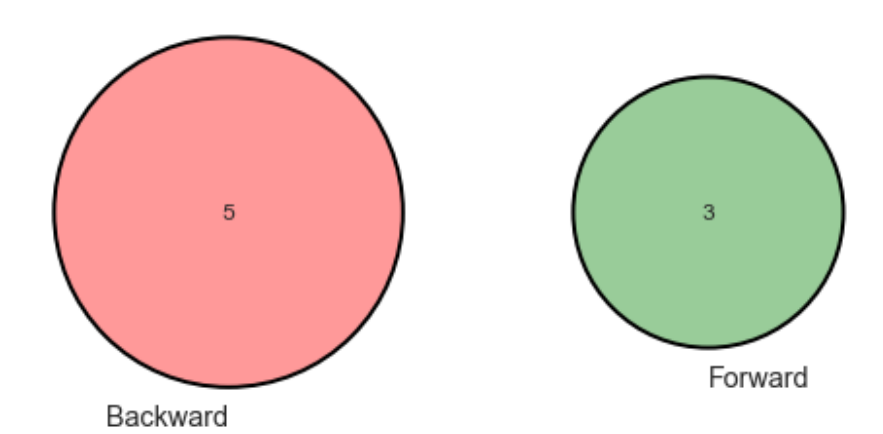
Scopus=s0 /State	Delta Visited	Delta Selected	Delta Precision%	Delta Recall%	Delta F_Measure%	Operation	Accumulated Visited	Accumulated Selected	Accumulated Precision%	Accumulated Recall%	Accumulated F_Measure%
s0: scopus	79	3	3.80	21.43	6.45	-	79	3	3.80	21.43	6.45
s1	75	5	6.67	35.71	11.24	backward	154	8	5.19	57.14	9.52
s2	62	0	0.00	0.00	0.00	backward	216	8	3.70	57.14	6.96
s3	198	3	1.52	21.43	2.83	forward	414	11	2.66	78.57	5.14
s4	10	0	0.00	0.00	0.00	forward	424	11	2.59	78.57	5.02

Report Strategy 6 - Measures of Strategy (accumulated)

Out[57]:

Strategy	Visited	Selected	Precision %	Recall %	F-Measure %
Scopus + BS + FS	424	11	2.59	78.57	5.02

Diagrama de Venn - Strategy 6



Report Diagrama de Venn

Backward ['soydan2006a', 'lee2009a', 'liao2005a', 'lee2008a', 'rungratri2008a']
Forward ['grambow2013a', 'soydan2012a', 'grambow2012a']

2.7 Strategy 7 - Scopus + Sequential Snowballing (Scopus + FS + BS)

Provenance Graph - Strategy 7 - Scopus + Sequential Snowballing (Scopus + FS + BS)



Report Strategy 7 - Scopus + Sequential Snowballing (Scopus + FS + BS)

Total of selected studies in the SLR = 14

Precision = Selected/ Visited
Recall = Selected/ Total of selected studies in the SLR
F-Measure = Harmonic Mean of Precision and Recall

Out[62]:

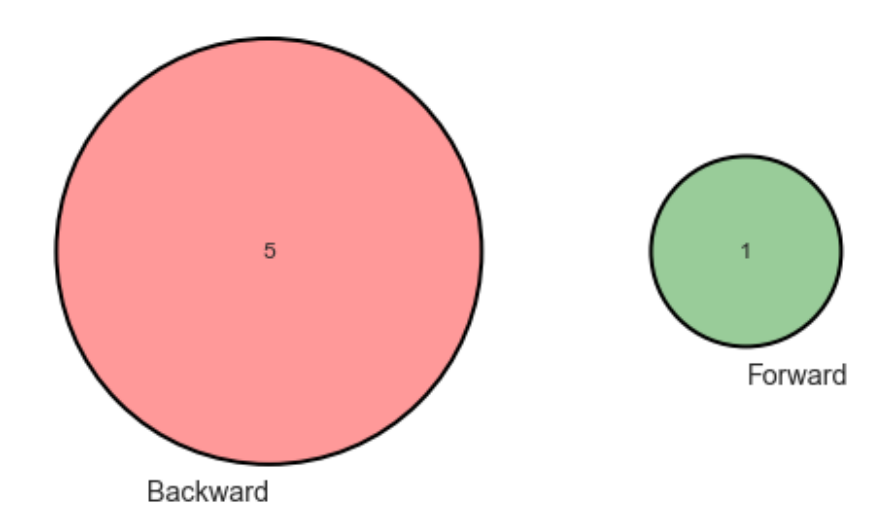
Scopus=s0 /State	Delta Visited	Delta Selected	Delta Precision%	Delta Recall%	Delta F_Measure%	Operation	Accumulated Visited	Accumulated Selected	Accumulated Precision%	Accumulated Recall%	Accumulated F_Measure%
s0: scopus	79	3	3.80	21.43	6.45	-	79	3	3.80	21.43	6.45
s1	19	1	5.26	7.14	6.06	forward	98	4	4.08	28.57	7.14
s2	7	0	0.00	0.00	0.00	forward	105	4	3.81	28.57	6.72
s3	110	5	4.55	35.71	8.06	backward	215	9	4.19	64.29	7.86
s4	60	0	0.00	0.00	0.00	backward	275	9	3.27	64.29	6.23

Report Strategy 7 - Measures of Strategy (accumulated)

Out[63]:

Strategy	Visited	Selected	Precision %	Recall %	F-Measure %
Scopus + FS + BS	275	9	3.27	64.29	6.23

Diagrama de Venn - Strategy 7



Report Diagrama de Venn

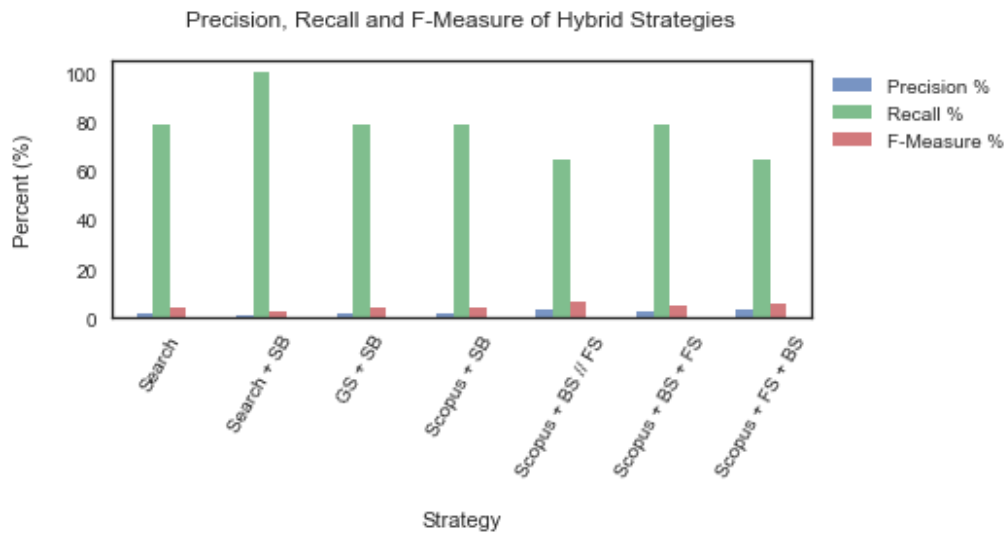
Backward ['soydan2006a', 'lee2009a', 'liao2005a', 'lee2008a', 'rungratri2008a']
Forward ['soydan2012a']

▼ 3 Analyses

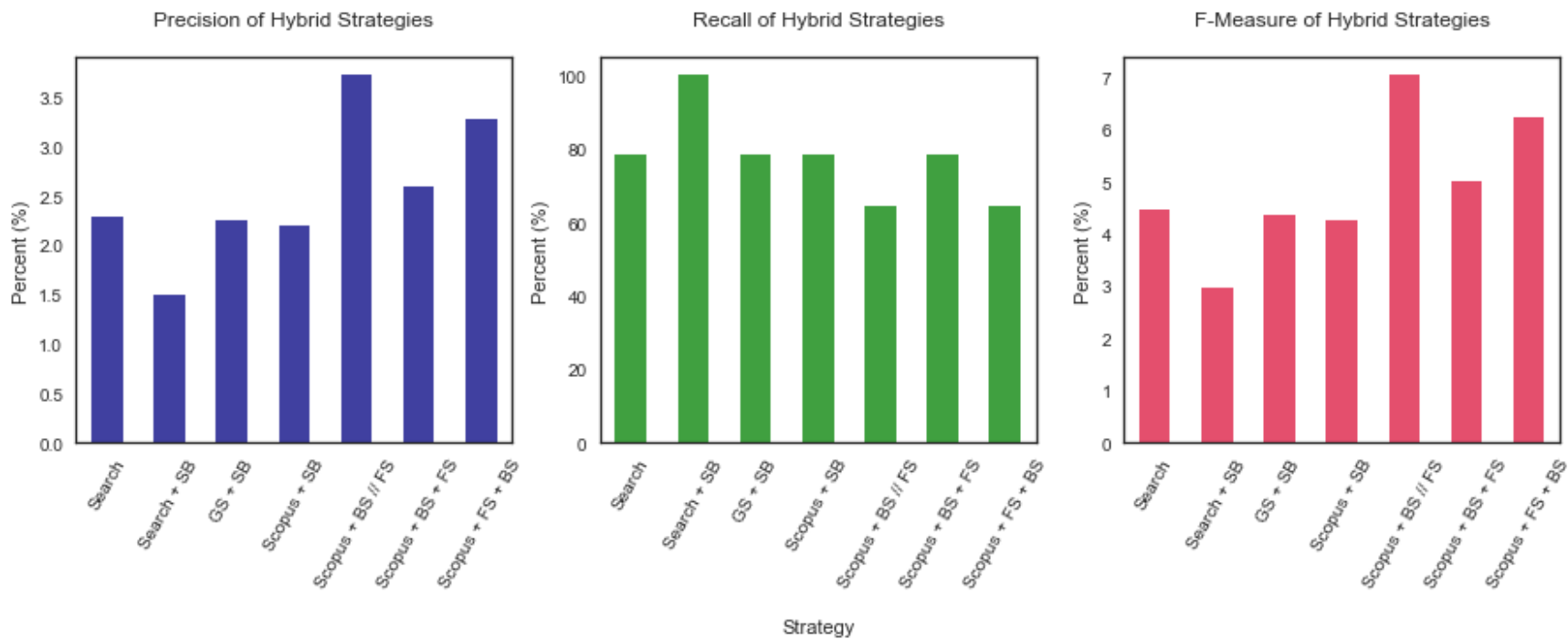
Out[67]:

Strategy	Visited	Selected	Precision %	Recall %	F-Measure %
Search	480	11	2.29	78.57	4.45
Search + SB	932	14	1.50	100.00	2.96
GS + SB	489	11	2.25	78.57	4.37
Scopus + SB	502	11	2.19	78.57	4.26
Scopus + BS // FS	242	9	3.72	64.29	7.03
Scopus + BS + FS	424	11	2.59	78.57	5.02
Scopus + FS + BS	275	9	3.27	64.29	6.23

Bar Chart Strategies



Bar Chart Strategies



▼ 4 Research Questions

RQ1) Which of the digital libraries used in the published SLR is more efficient?

Out[74]:

Digital Library	Visited	Selected	Precision %	Recall %	F-Measure %
acm	0	0	nan	0.00	0.00
googlescholar	466	11	2.36	78.57	4.58
ieee	0	0	nan	0.00	0.00
sciencedirect	21	0	0.00	0.00	0.00
scopus	79	3	3.80	21.43	6.45
springer	65	1	1.54	7.14	2.53
webofscience	0	0	nan	0.00	0.00
wiley	15	0	0.00	0.00	0.00

RQ2) Which of the hybrid strategies is more efficient?

Out[75]:

Strategy	Visited	Selected	Precision %	Recall %	F-Measure %
Search + SB	932	14	1.50	100.00	2.96
GS + SB	489	11	2.25	78.57	4.37
Scopus + SB	502	11	2.19	78.57	4.26
Scopus + BS // FS	242	9	3.72	64.29	7.03
Scopus + BS + FS	424	11	2.59	78.57	5.02
Scopus + FS + BS	275	9	3.27	64.29	6.23

RQ3) Which of the strategies is more efficient?

Out[76]:

Strategy	Visited	Selected	Precision %	Recall %	F-Measure %
Search	480	11	2.29	78.57	4.45
Search + SB	932	14	1.50	100.00	2.96
GS + SB	489	11	2.25	78.57	4.37
Scopus + SB	502	11	2.19	78.57	4.26
Scopus + BS // FS	242	9	3.72	64.29	7.03
Scopus + BS + FS	424	11	2.59	78.57	5.02
Scopus + FS + BS	275	9	3.27	64.29	6.23

RQ4) How many selected articles does the digital library find through the direct search for the title of the article?

Total of selected studies in the SLR = 14

Out[77]:

Digital Library	Selected	Recall %
acm	0	0.00
googlescholar	14	100.00
ieee	3	21.43
sciencedirect	1	7.14
scopus	7	50.00
springer	3	21.43
webofscience	5	35.71
wiley	0	0.00