Is Software Debloating Useful? - A comparative study

Sumit Lahiri, Amit Kumar Sharma

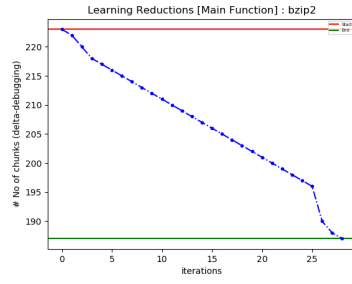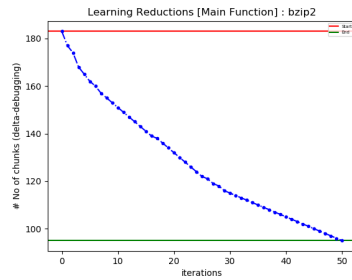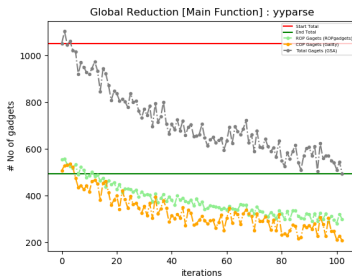**What is Program Debloating? What is Program Debloating?**

Index Terms—**Software Debloating, Software Engineering, Delta Debugging**

I. TOOLS

Program debloating techniques. Program deblaoting techniques rogram debloating techniques. Program deblaoting techniques rogram debloating techniques. Program deblaoting techniquesrogram debloating techniqu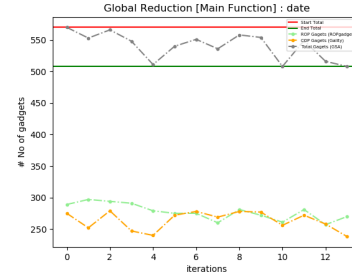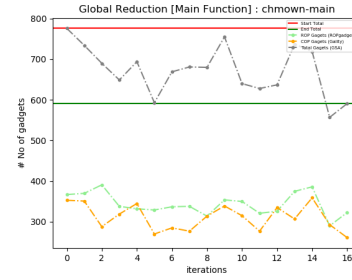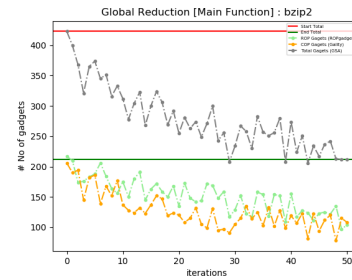es. Program deblaoting techniques rogram debloating techniques. Program deblaoting techniques rogram debloating techniques. Program deblaoting techniques rogram debloating techniques. Program deblaoting techniques rogram debloating techniques. Program deblaoting techniquesrogram debloating techniques. Program deblaoting techniques rogram debloating techniques. Program deblaoting techniques

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Figure 1: Learning plot for mkdir

Figure 6: Gadgets plot for mkdir
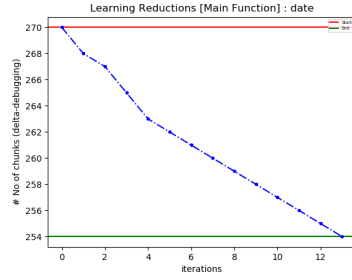
Figure 2: Learning plot for date

Figure 7: Gadgets plot for date

Figure 3: Learning plot for chown

Figure 8: Gadgets plot for chown

Figure 4: Learning plot for bzip2

Figure 9: Gadgets plot for bzip2

Figure 5: Gadgets plot for yyparse
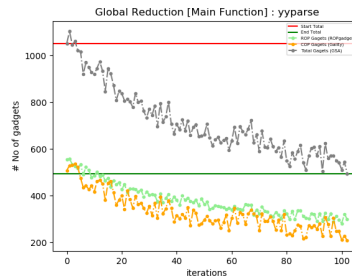
Figure 10: Gadgets plot for yyparse

II. Tools

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Libraries/Tools	**Before**	**None**	**Aggressive**	**DeepOCCAM RL Model**	**Non-rec Aggressive**	**Only once**	**IPDSE/IPSCCP Loop Unrolling**
Functions	4	4	3	3	3	4	3
Basic Blocks	451	445	450	450	450	445	448
Instructions Count	2521	2481	2523	2523	2523	2481	2523
Direct Calls	328	327	330	330	330	327	330
External Calls	322	321	326	326	326	321	325
Memory Instructions Load/Store	671	658	672	672	672	658	675

Table I: Comparision of DeepOCCAM with other OCCAM Run settings and OCCAM-T Run (Trimmer)

bzip2						
Libraries/Tools	**Before**	**None**	**Aggressive**	**DeepOCCAM RL Model**	**Non-rec Aggressive**	**Only once**	**IPDSE/IPSCCP Loop Unrolling**
Functions	61	35	54	54	54	35	54
Basic Blocks	2776	2538	3137	3137	3137	2538	3137
Instructions Count	24412	20540	23769	23769	23769	20540	23769
Direct Calls	4714	621	1011	1011	1011	621	1011
External Calls	4575	515	835	835	835	515	835
Memory Instructions Load/Store	5144	5209	5989	5989	5989	5209	5989

Table II: Comparision of DeepOCCAM with other OCCAM Run settings and OCCAM-T Run (Trimmer)

curl						
Libraries/Tools	**Before**	**None**	**Aggressive**	**DeepOCCAM RL Model**	**Non-rec Aggressive**	**Only once**	**IPDSE/IPSCCP Loop Unrolling**
Functions	124	59	62	62	52	59	57
Basic Blocks	2823	2764	4256	4375	3369	2764	3369
Instructions Count	11870	11777	17965	18106	14512	11777	15854
Direct Calls	1786	1696	2423	2500	2005	1696	2145
External Calls	1234	1250	1911	1911	1519	1250	1975
Memory Instructions Load/Store	2503	2511	3698	3858	3048	2511	3625

Table III: Comparision of DeepOCCAM with other OCCAM Run settings and OCCAM-T Run (Trimmer)

IV. TOOLS

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nettest_bsd						
Libraries/Tools	Before	None	Aggressive	DeepOCCAM RL Model	Non-rec Aggressive	Only once	IPDSE/IPSCCP Loop Unrolling
Functions	33	23	24	24	24	24	24
Basic Blocks	979	553	573	573	573	573	573
Instructions Count	6301	3045	3140	3140	3140	3140	3140
Direct Calls	862	402	412	412	412	412	412
External Calls	794	369	377	377	377	377	377
Memory Instructions Load/Store	2859	1350	1396	1396	1396	1396	1396

Table IV: Comparision of DeepOCCAM with other OCCAM Run settings and OCCAM-T Run (Trimmer)

httpd						
Libraries/Tools	Before	None	Aggressive	DeepOCCAM RL Model	Non-rec Aggressive	Only once	IPDSE/IPSCCP Loop Unrolling
Functions	1083	477	428	430	444	416	441
Basic Blocks	12943	11615	12563	13562	12999	11401	12652
Instructions Count	83238	62428	65842	66521	70773	61667	65252
Direct Calls	22603	5279	5152	5259	5932	5175	5869
External Calls	20712	4152	4563	4628	4787	4116	4625
Memory Instructions Load/Store	17071	16334	18345	17056	18347	16188	17854

Table V: Comparision of DeepOCCAM with other OCCAM Run settings and OCCAM-T Run (Trimmer)

GNU Tree						
Libraries/Tools	Before	None	Aggressive	DeepOCCAM RL Model	Non-rec Aggressive	Only once	IPDSE/IPSCCP Loop Unrolling
Functions	52	40	41	44	44	40	42
Basic Blocks	1458	1845	1850	1891	1891	1845	1850
Instructions Count	7442	8957	9152	9286	9286	8957	9365
Direct Calls	1051	1257	1150	1290	1290	1257	1362
External Calls	845	1167	1147	1200	1200	1167	1058
Memory Instructions Load/Store	1944	2362	2344	2344	2344	2222	2452

Table VI: Comparision of DeepOCCAM with other OCCAM Run settings and OCCAM-T Run (Trimmer)

VI. Tools

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Bzip2 Program	Original	Chisel Tool	OCCAM-T (Trimmer)	DeepOCCAM RL Model	OCCAM Aggressive	OCCAM None
ROP Gadgets	646	313	1311	1395	1336	1455
COP Gadgets	97	55	208	226	205	236
JOP Gadgets	6872	1562	3784	3722	3848	4585
Total Unique Gadgets (Excluding SYS & Chain)	7374	1930	5284	5117	5185	6345

Table VII: Gadgets count comparision for Bzip2

GNU Tree	Original	Chisel Tool	OCCAM-T (Trimmer)	DeepOCCAM RL Model	OCCAM Aggressive	OCCAM None
ROP Gadgets	567	487	483	567	713	515
COP Gadgets	50	153	19	146	39	83
JOP Gadgets	2126	2305	2774	1951	1951	2564
Total Unique Gadgets (Excluding SYS & Chain)	2693	2595	3258	2664	2664	3162

Table VIII: Gadgets count comparision for GNU Tree

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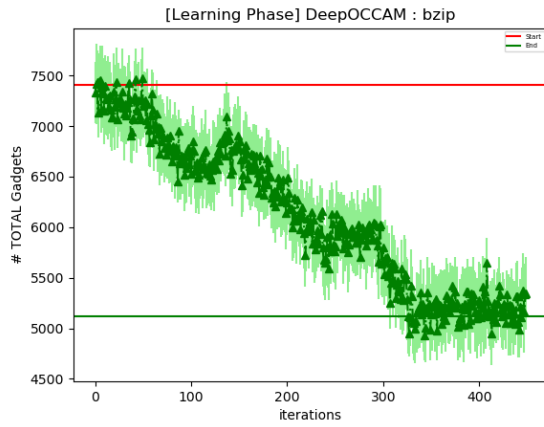techniques rogram debloating techniques. Program deblaoting techniques rogram debloating techniques. Program deblaoting techniques rogram debloating techniques. Program deblaoting techniques rogram debloating techniques. Program deblaoting techniquesrogram debloating techniques. Program deblaoting techniques rogram debloating techniques. Program deblaoting techniques

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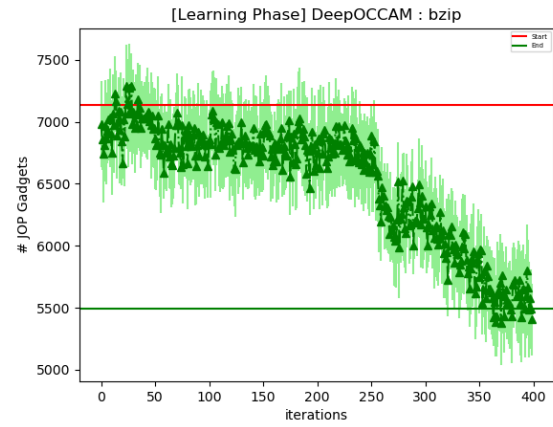
Figure 11: **DeepOCCAM Total**

450 iterations bzip - HF
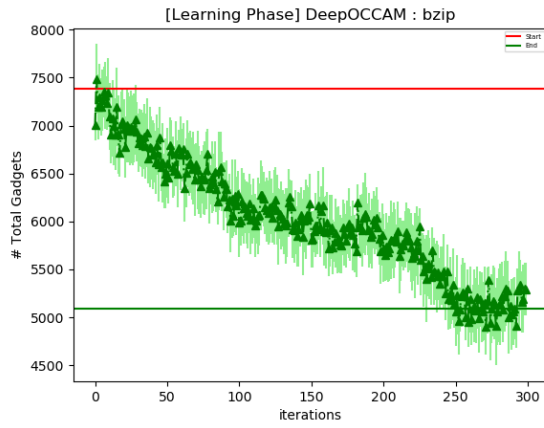

Figure 14: **DeepOCCAM JOP**

400 iterations bzip - HF
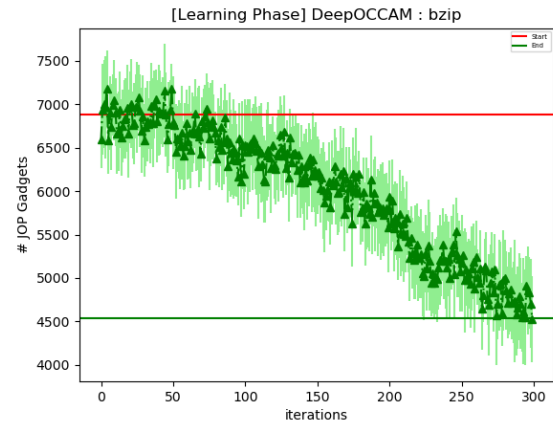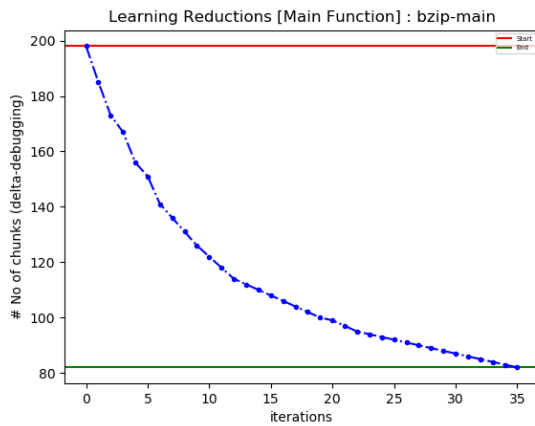

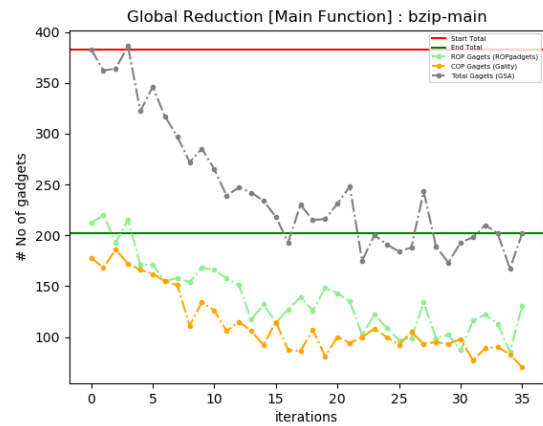Figure 12: **DeepOCCAM Total**

300 iterations bzip - inst2vec bzip embedding

Figure 15: **DeepOCCAM JOP**

300 iterations bzip - inst2vec bzip embedding

Figure 13: **Chisel** Learning bzip `main()`

Figure 16: **Chisel** Gadgets Count `main()`

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