		particle				saddle				probabilistic-lambda-calculus		probabilistic-prolog		backprop		
		FF	FR	RF	RR	FF	FR	RF	RR	F	R	F	R	Fs	Fv	R
VLAD	STALIN∇	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	■	1.00
FORTRAN	ADIFOR	1.52	■	■	■	2.07	■	■	■	■	■	■	■	11.84	2.68	■
	TAPENADE	3.40	■	■	■	2.56	■	■	■	■	■	■	■	11.35	4.33	6.24
C	ADIC	■	■	■	■	■	■	■	■	■	■	■	■	16.33	3.93	■
C++	ADOL–C	■	■	■	■	■	■	■	■	■	■	■	■	12.34	3.89	35.53
	CPPAD	■	■	■	■	■	■	■	■	■	■	■	■	42.15	■	23.69
	FADBAD++	65.69	■	■	■	22.44	■	■	■	■	■	■	■	98.96	33.15	53.03
ML	MLTON	53.89	88.88	16.08	28.06	40.39	51.21	1.86	2.67	106.45	124.95	789.41	483.47	73.94	■	37.94
	OCAML	160.50	340.35	147.91	263.66	107.71	156.33	6.75	13.51	215.73	538.68	1207.13	1534.61	157.75	■	149.14
	SML/NJ	106.21	182.45	105.04	185.15	84.38	106.01	3.55	6.31	197.75	272.45	2448.02	1471.94	142.71	■	94.97
HASKELL	GHC	165.22	■	■	■	121.18	■	■	■	■	■	■	■	■	■	■
SCHEME	BIGLOO	505.90	761.40	104.81	228.56	423.69	440.25	15.77	24.59	832.92	1048.11	14422.16	8286.06	577.45	■	306.60
	CHICKEN	1120.37	2026.31	425.60	1872.85	889.58	1144.65	35.73	68.94	2305.98	3283.00	66948.70	37792.84	1391.75	■	971.91
	GAMBIT	444.13	752.63	138.34	256.30	362.65	420.48	14.08	23.87	879.88	1153.86	24316.03	13649.81	545.20	■	341.73
	IKARUS	192.07	312.28	61.79	114.87	158.88	205.97	6.75	11.40	437.46	531.10	8242.92	4845.86	216.42	■	147.49
	LARCENY	726.59	1108.18	144.55	270.14	571.81	613.65	19.14	29.77	1651.01	1673.22	25589.62	14833.53	955.98	■	486.64
	MIT SCHEME	1472.26	2500.00	309.66	591.36	1243.26	1428.57	51.36	79.10	3491.10	4130.19	85819.57	48335.38	1900.04	■	1141.22
	MZC	2073.26	3434.64	340.30	655.83	2436.26	1996.40	72.45	150.02	5289.17	5929.14	154206.95	83480.27	2439.93	■	1571.52
	MZSCHEME	2344.70	4076.16	409.95	843.68	2000.89	2332.43	80.78	134.00	6235.78	7134.71	166129.12	91630.70	3477.86	■	1866.28
	SCHEME->C	391.42	605.26	109.77	198.43	324.95	328.84	12.74	18.28	682.15	794.31	10530.66	5980.27	484.24	■	233.75
	SCMUTILS	3321.20	■	■	■	2800.71	■	■	■	6456.99	■	80100.23	■	4544.48	■	■
	STALIN	208.10	366.08	51.84	91.86	166.96	212.93	7.68	11.40	1240.73	1137.41	22511.79	10986.43	832.68	■	367.84

All run times normalized relative to a unit run time for STALIN∇ on the corresponding example except that run times for `backprop-Fv` are normalized relative to a unit run time for STALIN∇ on `backprop-Fs`. Pre-existing AD tools are named in blue. Others were implemented by us.

■ not implemented but could implement

■ not implemented in pre-existing AD tool

■ can't implement

		particle				saddle			
		FF	FR	RF	RR	FF	FR	RF	RR
VLAD	STALIN∇	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FORTRAN	ADIFOR	1.52	■	■	■	2.07	■	■	■
	TAPENADE	3.40	■	■	■	2.56	■	■	■
C++	FADBAD++	65.69	■	■	■	22.44	■	■	■
ML	MLTON	53.89	88.88	16.08	28.06	40.39	51.21	1.86	2.67
	OCAML	160.50	340.35	147.91	263.66	107.71	156.33	6.75	13.51
	SML/NJ	106.21	182.45	105.04	185.15	84.38	106.01	3.55	6.31
HASKELL	GHC	165.22	■	■	■	121.18	■	■	■
SCHEME	BIGLOO	505.90	761.40	104.81	228.56	423.69	440.25	15.77	24.59
	CHICKEN	1120.37	2026.31	425.60	1872.85	889.58	1144.65	35.73	68.94
	GAMBIT	444.13	752.63	138.34	256.30	362.65	420.48	14.08	23.87
	IKARUS	192.07	312.28	61.79	114.87	158.88	205.97	6.75	11.40
	LARCENY	726.59	1108.18	144.55	270.14	571.81	613.65	19.14	29.77
	MIT SCHEME	1472.26	2500.00	309.66	591.36	1243.26	1428.57	51.36	79.10
	MZC	2073.26	3434.64	340.30	655.83	2436.26	1996.40	72.45	150.02
	MZSCHEME	2344.70	4076.16	409.95	843.68	2000.89	2332.43	80.78	134.00
	SCHEME->C	391.42	605.26	109.77	198.43	324.95	328.84	12.74	18.28
	SCMUTILS	3321.20	■	■	■	2800.71	■	■	■
	STALIN	208.10	366.08	51.84	91.86	166.96	212.93	7.68	11.40

All run times normalized relative to a unit run time for STALIN∇ on the corresponding example.
Pre-existing AD tools are named in blue. Others were implemented by us.

■ not implemented but could implement

■ not implemented in pre-existing AD tool

■ can't implement

		probabilistic-lambda-calculus		probabilistic-prolog	
		F	R	F	R
VLAD	STALIN∇	1.00	1.00	1.00	1.00
ML	MLTON	106.45	124.95	789.41	483.47
	OCAML	215.73	538.68	1207.13	1534.61
	SML/NJ	197.75	272.45	2448.02	1471.94
HASKELL	GHC	■	■	■	■
SCHEME	BIGLOO	832.92	1048.11	14422.16	8286.06
	CHICKEN	2305.98	3283.00	66948.70	37792.84
	GAMBIT	879.88	1153.86	24316.03	13649.81
	IKARUS	437.46	531.10	8242.92	4845.86
	LARCENY	1651.01	1673.22	25589.62	14833.53
	MIT SCHEME	3491.10	4130.19	85819.57	48335.38
	MZC	5289.17	5929.14	154206.95	83480.27
	MZSCHEME	6235.78	7134.71	166129.12	91630.70
	SCHEME->C	682.15	794.31	10530.66	5980.27
	SCMUTILS	6456.99	■	80100.23	■
	STALIN	1240.73	1137.41	22511.79	10986.43

All run times normalized relative to a unit run time for STALIN∇ on the corresponding example.
Pre-existing AD tools are named in blue. Others were implemented by us.
■ not implemented but could implement, including FORTRAN, C, and C++
■ not implemented in pre-existing AD tool
■ can't implement

		backprop		
		Fs	Fv	R
VLAD	STALIN∇	1.00	■	1.00
FORTRAN	ADIFOR	11.84	2.68	■
	TAPENADE	11.35	4.33	6.24
C	ADIC	16.33	3.93	■
C++	ADOL–C	12.34	3.89	35.53
	CPPAD	42.15	■	23.69
	FADBAD++	98.96	33.15	53.03
ML	MLTON	73.94	■	37.94
	OCAML	157.75	■	149.14
	SML/NJ	142.71	■	94.97
HASKELL	GHC	■	■	■
SCHEME	BIGLOO	577.45	■	306.60
	CHICKEN	1391.75	■	971.91
	GAMBIT	545.20	■	341.73
	IKARUS	216.42	■	147.49
	LARCENY	955.98	■	486.64
	MIT SCHEME	1900.04	■	1141.22
	MZC	2439.93	■	1571.52
	MZSCHEME	3477.86	■	1866.28
	SCHEME->C	484.24	■	233.75
	SCMUTILS	4544.48	■	■
	STALIN	832.68	■	367.84

All run times normalized relative to a unit run time for STALIN∇ on the corresponding example except that run times for `backprop-Fv` are normalized relative to a unit run time for STALIN∇ on `backprop-Fs`. Pre-existing AD tools are named in blue. Others were implemented by us.

■ not implemented but could implement
■ not implemented in pre-existing AD tool
■ can't implement