

CURRICULUM VITA OF PAUL W. PURDOM, JR.

2212 Belhaven
Bloomington, Indiana 47401
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Born: April, 1940, Atlanta, GA

Computer Science Department
215 Lindley Hall
Indiana University
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Interest: Analysis of algorithms
Compilers
Knuth-Bendix algorithm

Education

Ph.D. 1966 California Institute of Technology (Physics)
M.S. 1962 California Institute of Technology (Physics)
B.S. 1961 California Institute of Technology (Physics)

Employment

Summer 1990 Guest Researcher, FAW, Ulm, Germany
1982 – present Professor, Computer Science Department, Indiana University
1978 – 1982 Department Chairman, Computer Science Department, Indiana University
1977 – 1978 Acting Department Chairman, Computer Science Department, Indiana University
1974 – 1977 Summer employee of Bell Telephone Laboratories
1971 – 1982 Associate Professor, Computer Science Department, Indiana University
1970 – 1971 Member of Technical Staff, Bell Telephone Laboratories, Indian Hill
1970 – 1971 Associate Professor (on leave), Computer Science Department, University of Wisconsin
1965 – 1970 Assistant Professor, Computer Science Department

Editor

ACM Computing Surveys, Associate Editor for Algorithms.
e-SAT, Associate Editor. (This journal is being formed in late 2003.)

Grants

“Analysis of Backtracking with Search Rearrangement” Cynthia Brown and Paul Purdom, Principal Investigators. NSF (Theoretical Computer Science) 6-79 to 11-81 and 6-81 to 11-83.
“Analysis of Algorithms for NP-Complete Problems” Paul Purdom, Principal Investigator. NSF (Computer Research) 7-83 through 6-85.
“Analyses of Constraint Satisfaction Algorithms” Paul Purdom, Principal Investigator. NSF (Computer and Computation Research) 9-92 through 6-95.
“Speed of Constraint Satisfaction Algorithms”, Paul Purdom, Principal Investigator, NSF (Computer and Computation Research) 8-94 through 12-97.

Awards

6th place, 1992 SAT Contest. See “Report on a SAT competition”, M. Buro and H. Kleine-Büning, *EATCS Bulletin* **49** (1993) pp 143–151.

Journal Articles Submitted

“Average Case Performance of the Apriori Algorithm”, Paul W. Purdom, Dirk Van Gucht, and Dennis P. Groth, accepted by *SIAM J. Comput.*

“Recoding Sequence Data for Parsimony Algorithms”, Paul Walton Purdom Jr., Michael S. Rosenberg, and Sudhir Kumar.

“A parsimony tree for the SAT 2002 contest”, Paul Walton Purdom Jr., Daniel Le Berre, and Laurent Simon, accepted by *Annals of Mathematics and Artificial Intelligence*.

Journal Publications

“Single Column Discrepancy and Dynamic Max-mini Optimizations for Quickly Finding the Most Parsimonious Evolutionary Trees”, Paul W. Purdom Jr., Phillip G. Bradford, Koichiro Tamura, and Sudhir Kumar, *Bioinformatics* **16** (2000) pp 140–151.

“Algorithms for the Satisfiability (SAT) Problem: A Survey”, Jun Gu, Paul W. Purdom, John Franco, and Benjamin W. Wah. *DIMACS series in Discrete Mathematics and Theoretical Computer Science Vol. 35*, (1997) pp 19–151.

“Backtracking and Random Constraint Satisfaction”, Paul Walton Purdom Jr, *Annals of Mathematics and Artificial Intelligence* **20** (1997) pp 393–410.

“Probe Order Backtracking”, Paul Walton Purdom Jr and G. Neil Haven, *SIAM J. Comput.* **26** (1997) pp 456–483.

“Backtrack Searching in the Presence of Symmetry”, C. A. Brown, L. A. Finkelstein, and P. W. Purdom Jr., *Nordic Journal of Computing* **3** (1996) pp 203–219.

“Average Time for the Full Pure Literal Rule”, Paul Walton Purdom Jr., *Information Sciences* **78** (1994) pp 269–291.

“Average Time Analysis of Clause Order Backtracking”, Khaled M. Bugarara and Paul Walton Purdom Jr., *SIAM J. Comp.* **22** (1993) pp 303–317.

“A Practical Unification Algorithm”, Paul W. Purdom, *Information Sciences* **55** (1991) pp 123–128.

“A Survey of Average Time Analyses of Satisfiability Algorithms”, Paul Purdom, *Journal of Information Processing* **13** (1990) pp 449–455.

“A New Base Change Algorithm for Permutation Groups”, Cynthia A. Brown, Larry A. Finkelstein and Paul W. Purdom Jr., *SIAM J. Comput.* **18** (1989) pp 1037–1047.

“Exponential Average Time for the Pure Literal Rule”, Khaled M. Bugarara, Youfang Pan, and Paul Walton Purdom Jr., *SIAM J. Comput.* **18** (1989) pp 409–418.

“An Exponential Lower Bound For the Pure Literal Rule”, Khaled M. Bugarara and Paul Walton Purdom Jr., *Information Processing Letters* **27** (1988) pp 215–219.

“Experiments on Alternatives to Minimax”, Dana Nau, Paul Purdom, and Chun-Hung Tzeng, *International Journal of Parallel Programming* **15** (1987) pp 163–183.

“Polynomial-Average-Time Satisfiability Problems”, Paul Walton Purdom Jr. and Cynthia A. Brown, *Information Sciences* **41** (1987) pp 23–42.

- “Tree Matching and Simplification”, Paul Walton Purdom Jr. and Cynthia A. Brown, *Software - Practice and Experience* **17** (1987) pp 105–115.
- “The Pure Literal Rule and Polynomial Average Time”, Paul Walton Purdom Jr. and Cynthia A. Brown, *SIAM J. Comput.* **14** (1985) pp 943–953.
- “A Methodology and Notation for Compiler Front End Design”, Cynthia A. Brown and Paul W. Purdom Jr., *Software - Practice and Experience* **14** (1984) pp 335–346.
- “Solving Satisfiability Problems with Less Searching”, Paul W. Purdom Jr., *IEEE Transactions of Patern Analysis and Machine Intelligence* **6** (1984) pp 510–513.
- “An Analysis of Backtracking with Search Rearrangement”, Paul Walton Purdom Jr./ and Cynthia A. Brown *SIAM J. Comput.* **12** (1983) pp 717–733.
- “Search Rearrangement Backtracking and Polynomial Average Time”, Paul Walton Purdom Jr., *Artificial Intelligence* **21** (1983) pp 117–133.
- “Average Time Analysis of Simplified Davis-Putnam Procedures”, Allen Goldberg, Paul Purdom, and Cynthia A. Brown, *Information Processing Letters* **15** (1982) pp 72–75. See **16** (1983) pp 213 for corrections to the typesetting errors that the publisher made.
- “An Empirical Comparison of Backtracking Algorithms”, Cynthia A. Brown and Paul Walton Purdom Jr., *IEEE Transactions of Patern Analysis and Machine Intelligence* **4** (1982) pp 309–316.
- “Backtracking with Multi-Level Dynamic Search Rearrangement”, Paul Walton Purdom Jr., Cynthia A. Brown, and Edward L. Robertson, *Acta Informatica* **15** (1981) pp 99–113.
- “Average Time Analysis of Backtracking”, Cynthia A. Brown and Paul Walton Purdom Jr., *SIAM J. Comput.* **10** (1981) pp 583–593.
- “Parsing Extended LR(k) Grammars”, Paul Walton Purdom Jr. and Cynthia A. Brown, *Acta Informatica* **15** (1981) pp 115–127.
- “Exact Formulas for the Buddy System”, Paul W. Purdom Jr. and Cynthia A. Brown, *Information Sciences* **22** (1980) pp 1–18.
- “Semantic Routines and LR(k) Parsers”, Paul Purdom and Cynthia A. Brown, *Acta Informatica* **14** (1980) pp. 299–315.
- “Tree Size by Partial Backtracking”, Paul W. Purdom, *SIAM J. on Computing* **7** (1978) pp 481–491.
- “Automatic Program Indentation”, P. W. Purdom *BIT* **18** (1978) pp 211–218.
- “Analysis of a Multi-Level Time-Sharing Model”, Harry C. Heacox, Jr. and Paul W. Purdom Jr., *BIT* **14** (1974) pp 407–412.
- “The Size of LALR(1) Parsers”, Paul Purdom, *BIT* **14** (1974), pp. 326–337.
- “A Sentence Generator for Testing Parsers”, Paul Purdom *BIT* **12** (1972) pp 366–375.
- “Immediate Predominators in a Directed Graph”, Paul W. Purdom Jr. and Edward F. Moore, *Communications of the ACM* **15** (1972) pp 777–778.
- “Analysis of Two Time-Sharing Queueing Models”, Harry C. Heacox, Jr. and Paul W. Purdom Jr., *Journal of the ACM* **19** (1972) pp 70–91.
- “Statistical Investigations of Three Storage Allocation Methods”, P. W. Purdom, S. M. Stigler, and Tat-Ong Cheam, *BIT* **11** (1971) pp 187–195.
- “Statistical Properties of the Buddy System”, Paul W. Purdom and Stephen M. Stigler, *JACM* **17** (1970) pp 684–697.
- “A Transitive Closure Algorithm”, Paul Purdom Jr., *BIT* **10** (1970) pp 76–95.

“Cycle Length in a Random Function”, P. W. Purdom and J. H. Williams, *Transactions of the American Mathematical Society* **133** (1968) pp 547–551.

“Electromagnetic Decay of the 2.43- and 1.7-MeV Levels in ${}^9\text{Be}$ ”, Paul Purdom Jr., P. A. Seeger and R. W. Kavangh, *Nuclear Physics 83* (1966), pp. 513–527.

Book and Book Chapters

Analysis of Algorithms, Paul Walton Purdom Jr. and Cynthia A. Brown, Holt, Rinehart & Winston, NY, (1985) (now distributed by Oxford University Press).

Handbook of Applied Optimization, Chapter “Algorithms for Satisfiability (SAT) Problem”, Jun Gu, Paul Purdom, John Franco, and Benjamin W. Wah, Oxford University Press (2002).

Conference Proceedings

“Integrating Symmetry Breaking into a DLL Procedure”, Chu Min Li, Bernard Jurkowiak, and Paul Walton Purdom, 2002 *Fifth International Symposium on Theory and Applications of Satisfiability* at Cincinnati, OH.

“Backtracking and Probing”, Paul Walton Purdom and G. Neil Haven. *DIMACS series in Discrete Mathematics and Theoretical Computer Science* **35** (1997) pp 153–209.

“Average Case Analysis of the Apriori Algorithm”, Paul Purdom and Dirk VanGucht, 1999 *Informatics*, Cincinnati, Ohio. Also in “Average Case Performance of the Apriori Algorithm”, Paul Purdom and Dirk VanGucht, *6th International Symposium on AI and Math (2000)* at Fort Lauderdale, FL (invited session).

“Single Column Discrepancy and Dynamic Max-mini Sequence Addition Optimization to Enhance the Computational Efficiency for Finding the Most Parsimonious Evolutionary Trees using Molecular Data”, with Phillip G. Bradford, Koichiro Tamura and Sudhir Kumar, *Large Scale Phylogeny Symposium*, Princeton, NJ (1998).

“Random Satisfiability Problems”, *Proceedings of the International Workshop on Discrete Algorithms and Complexity*, Fukuoka, Japan (November 20–22, 1989) pp 253–259.

“Probabilistic Analysis of Search Algorithms”, Paul Purdom and Khaled Bugrara, CORS/TIMS/ORSA, Vancouver, Canada, 1989.

“Backtracking and Random Constraint Satisfaction”, Paul Purdom, Workshop on Mathematics and Artificial Intelligence, Ulm, W. Germany, December 19–22, 1988.

“Backtrack Searching in the Presence of Symmetry”, Cynthia A. Brown, Larry A. Finkelstein and Paul W. Purdom Jr., *Proceedings of the Sixth International Conference on Algebraic Algorithms and Error Correcting Codes (AAECC)*. LNCS **357** pp 99–110, Springer-Verlag (1989).

“Detecting Looping Simplifications”, *Second International Conference on Rewriting Techniques and Applications*, Paul Walton Purdom Jr., Bordeaux, France (May, 1987). Also in Pierre Lescanne (ed.), *Rewriting Techniques and Applications*, LNCS **256**, pp. 54–61, Springer-Verlag, New York (1987).

“Intelligent Backtracking Using Symmetry”, Cynthia A. Brown, Larry A. Finkelstein, and Paul Walton Purdom Jr., *Proceedings of the Joint IEEE/ACM Computer Conference* (Fall, 1986) pp 576–584.

“Estimation of Minimax Values”, Chun-Hung Tzeng and Paul Purdom, *Proceedings of the ACM SIGART International Symposium on Methodologies for Intelligent Systems* pp 174–182, Knoxville, TN (October 21–25, 1986).

- “An Evaluation of Two Alternatives to Minimax”, Dana Nau, Paul Purdom, and Chun-Hung Tzeng, *Workshop on Uncertainty and Probability in Artificial Intelligence*, UCLA, (August, 1985). Also in Laveen N. Kanal and John F. Lemmer (eds.), *Uncertainty in Artificial Intelligence* (1986) pp 505–509, Elsevier Science Publishers B.V. (North-Holland).
- “Generalized k -Level Search Rearrangement”, Khaled M. Bugarra and Paul Purdom *Twenty Third Annual Allerton Conference on Communication, Control and Computing*, Monticello, Ill. (1985) pp 101–102.
- “Analyses of Algorithms for Satisfiability Problems”, Paul Purdom *Twelfth International Mathematical Programming Symposium*, Cambridge, Mass. (August 5–9, 1985).
- “Fast Many-to-One Matching Algorithms”, Paul Walton Purdom Jr. and Cynthia A. Brown, *First International Conference on Rewriting Techniques and Applications*, Dijon, France (May, 1985). Also in Jean-Pierre Jouannand (ed.), *Rewriting Techniques and Applications*, LNCS **202**, pp. 407–416, Springer-Verlag, New York (1985).
- “A Theory of Game Trees”, Ch. H. Tzeng and Paul Purdom *Proceedings of the National Conference on Artificial Intelligence* (1983) pp 410–419.
- “Searching in Polynomial Average Time”, Cynthia A. Brown and Paul Walton Purdom Jr., *Twentieth Annual Allerton Conference on Communication, Control and Computing*, Monticello, Ill. (1982) pp 943–944.
- “Evaluating Search Methods Analytically”, Cynthia A. Brown and Paul Walton Purdom Jr., *National Conference on Artificial Intelligence* (1982) pp 124–127.
- “How to Search Efficiently”, Cynthia A. Brown and Paul Walton Purdom Jr., *Seventh International Joint Conference on Artificial Intelligence*, Vancouver, British Columbia (1981) pp 588–594.
- “Average Time for Satisfiability Algorithms”, Cynthia A. Brown and Paul Walton Purdom Jr. *Nineteenth Annual Allerton Conference on Communication, Control and Computing*, Monticello, Ill. (1981), p. 644.

Major Programs

- Program for parsimony*, Paul Purdom. Used for research on phylogenetic trees. This program was also a test-bed for a few of the algorithms that have been put into the Mega program by Sudhir Kumar and his coauthors (see <http://www.megasoftware.net>).
- Rewrite rule program*, Paul Purdom. Used for research on rewrite rules.
- Student Compiler*, Paul Purdom. Used in teaching courses on compilers.
- Automatic Parser Builder for SLR(1) Grammars* (Based on DeRemer’s method), Paul Purdom.
- MIX Assembler and Interpreter*, Dennison, Goldenberg, Purdom, Gaynes, and Nission. Used in teaching machine language programming.
- WASP Assembler and Interpreter*, Tavernini and Purdom. Used in machine language programming.
- The Automatic Optimization of SLIP Routines*, Lee Heindel and Paul Purdom, SIGSAM Bulletin #8 (1967).