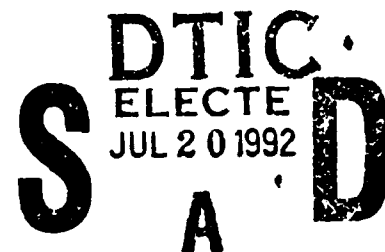




Final Report ONR Grant 91-92
Grant# N00014-91-J-1924

JULY 1992



PAPERS

I finished the following papers during this year.

1. "Pattern Matching: A Sheaf-Theoretic Approach."
To appear in the proceedings of the Conference on Algebraic Methodology and Software Technology (Iowa City, May 1991),
Lecture Notes in Computer Science, Springer-Verlag.
2. "A Sheaf Theoretic Approach to Pattern Matching and Related Problems."
To appear in *Theoretical Computer Science*.
3. "Derivation of a Parallel Matching Algorithm."
To appear in the proceedings of the Conference on Mathematics of Program Construction (Oxford, June 1992),
Lecture Notes in Computer Science, Springer-Verlag.

CONFERENCES

I attended the following conferences and gave talks at the last three:

1. IFIP Working Conference on Constructing Programs from Specifications, Asilomar, May 13-16, 1991
2. Conference on Algebraic Methodology and Software Technology, Iowa City, May 21-24, 1991
3. IFIP WG2.1 Meeting, Rio de Janeiro, Jan 19-23, 1992
4. Workshop on Types and Algorithms, New Orleans, May 17-20, 1992

VISITS

I visited the following places, gave talks, and met other researchers:

1. University of Pennsylvania, Dec 1991
2. Courant Institute/New York University, Dec 1991
3. Carnegie Mellon University, Dec 1991
4. IBM Yorktown Heights, Dec 1991
5. SRI International, Mar 1992

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ACTIVITIES

1. Lectures on category theory at Kestrel, July 1991:
A series of lectures providing an introduction to category theory to an audience with a background primarily in computer science.
2. Attempted to derive pattern matching algorithms using KIDS:
I have encoded in KIDS (Kestrel Interactive Development System) some of the theories required for the derivation of a generalized

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Knuth-Morris-Pratt pattern matching algorithm. Deriving the algorithm has proved difficult because of some deficiencies in the KIDS system (lack of higher-order facilities, lack of AC-unification, etc.). Moreover, my topological approach to data structures is quite different from the first-order theories/algebraic specification based techniques used in KIDS. More work needs to be done to bridge the gap between the two approaches.

3. I explored the relationship between Grothendieck topologies, sheaves, and algebraic specification. Topologies seem to provide a better concept of modularity: one can slice specifications at any grain level, thus liberating one from the somewhat arbitrary boundaries imposed by specifications. Such an approach also facilitates the integration of type-theoretic concepts (such as polymorphism, type inference, etc.) and state (especially, objects) into algebraic specification.

Georgia Technology Research Corp.,
Atlanta

Per telecon ONR 7/20/92

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