Lecture Notes in Computer Science

Edited by G. Goos and J. Hartmanis

153

Graph-Grammars and Their Application to Computer Science

2nd International Workshop
Haus Ohrbeck, Germany, October 4–8, 1982

"Under the auspices of the European Association for Theoretical Computer Science"

Edited by
Hartmut Ehrig, Manfred Nagl, and Grzegorz Rozenberg

Springer-Verlag
Berlin Heidelberg New York Tokyo 1983

Editors

Hartmut Ehrig
FB Informatik, TU Berlin
Franklinstr. 28/29, 1000 Berlin 10, FRG

Manfred Nagl
Angewandte Informatik, FB 6, Universität Osnabrück
Postfach 4469, 4500 Osnabrück, FRG

Grzegorz Rozenberg
Institut of Applied Mathematics and Computer Science
University of Leiden, Wassenaarseweg 80, P.O.Box 9512
2300 RA Leiden, The Netherlands

CR Subject Classifications (1982): 4.0, 5.0

ISBN 3-540-12310-5 Springer-Verlag Berlin Heidelberg New York Tokyo
ISBN 0-387-12310-5 Springer-Verlag New York Heidelberg Berlin Tokyo

Printing and binding: Beltz Offsetdruck, Hemsbach/Bergstr.
2145/3140-543210

Preface

The theory of graph grammars refers to the extension of formal language theory that deals with structures more general than strings - for example graphs and maps. This theory is well motivated by many potential applications in the areas such as data bases, software specification, incremental compilers, pattern recognition and developmental biology. Due to diverse applications and motivations the "graph grammar community" consists of researchers of very different backgrounds.

In order to promote the scientific contacts within this community the first international workshop on graph-grammars was organised in 1978 in Bad Honnef, Germany. The meeting has turned out to be successful in the sense that it broadened our understanding of what the whole area is about and it made most of the participants even more decided than before to devote their scientific efforts to the further development of this well motivated and mathematically very challenging area.

Four years later, in 1982, the 2nd international workshop on graph grammars and their applications to computer science took place in Haus Ohrbeck (near Osnabrück) in West Germany. It was very pleasant to notice that the whole area really matured in the period between two workshops. (The bibliography prepared for the 1st workshop consisted of 230 entries while the bibliography enclosed in this volume consists of 480 entries !!). One could record a definite progress in several "established" research areas as well as the appearance of a number of new developments both on the theoretical and the application front. In particular we have noticed that a lot of work presented at the second workshop had its origins in the lectures and discussions that took place during the first workshop.

The material presented in Haus Ohrbeck was divided into seven categories: software specification, theory, pattern recognition, concurrency, biology and data bases. This division reflects the current trends in graph grammars. The present volume is based on this material; however, papers are presented in the alphabetical order because many of the above areas have nonempty intersection. Not all of the papers presented at the meeting appear in this volume, on the other hand some papers from this volume were not presented at the meeting - in our opinion their inclusion gives a better view of the current state of art in graph grammars theory.

The meeting would not have been possible without the financial support from
- Deutsche Forschungsgemeinschaft
- Niedersächsischer Minister für Wissenschaft und Kunst
- Universität Osnabrück.

We are very grateful for that. We are also grateful to all the participants of the meeting (scientists from 16 countries), for turning it into such a pleasant and scientifically useful week.

H. Ehrig
M. Nagl
G. Rozenberg

Table of contents

255

267

288

297

314

333

349

369