

# WAVE\*

Emilio di Giacomo and Giuseppe Liotta

Dipartimento di Ingegneria Elettronica e dell'Informazione,  
Università degli Studi di Perugia,  
{digiacomo,liotta}@diei.ing.unipg.it

## 1 Short Description

*WAVE* (<http://lis.ing.unipg.it/wave>) is a system for algorithm visualization over the Internet designed with a novel paradigm, called *Publication-driven* approach [1,2]. The Publication-driven approach separates the task of executing the algorithm from that of running its visualization and thus it makes it possible to easily distribute such two tasks over the Internet. The idea behind the approach is as follows: The algorithm code runs on the developer machine, while the variables which are the subject of the animation are copied on the end-user machine in a suitable structure, called *Public Blackboard*. The algorithm code on the developer side is automatically enriched with a set of *animation instructions*, each corresponding to an event that is relevant for the animation. When an interesting event happens for a variable that has a copy in the Public Blackboard, the corresponding animation instruction sends a message over the Internet, that activates a visualization routine on the end-user machine.

## 2 Areas of Application

*WAVE* has been tested for the visualization of graph drawing and geometric computing algorithms.

## 3 Layout Algorithms and Layout Features

Currently, *WAVE* supports algorithms for proximity drawings, layered drawings, dominance drawings, and HV-drawings [3].

## 4 Architecture

*WAVE* is a system distributed over the Internet. The algorithm to be visualized is executed by the *Algorithm server* on the algorithm developer's machine. The animation is displayed on an *Animation applet* running inside a Web browser on the end-user's machine. The *WAVE main server* acts as bridge between them.

\* Research supported in part by the CNR Project "Geometria Computazionale Robusta con Applicazioni alla Grafica ed al CAD", the project "Algorithms for Large Data Sets: Science and Engineering" of the Italian Ministry of University and Scientific and Technological Research (MURST 40%).

#### 4.1 Programming Language

WAVE is implemented in the Java Language.

#### 4.2 Operating System

WAVE has been tested on Windows, Linux and Unix system.

### 5 Interfaces

WAVE has a graphical interface that allows user to graphically edit input for the algorithm, and to see its animation.

### 6 Screenshot

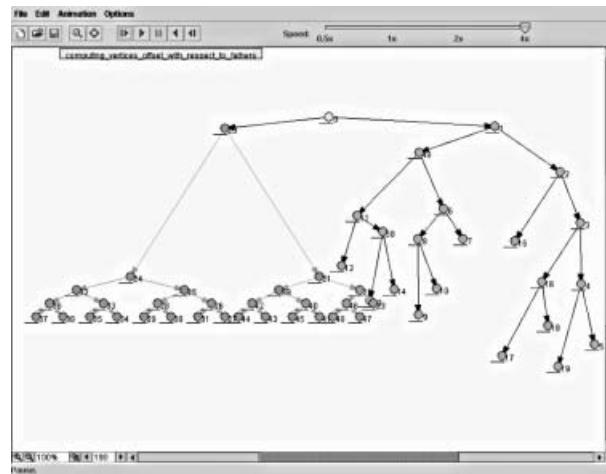


Fig. 1. Animating an algorithm for layered drawings of binary trees with WAVE.

### References

1. C. Demetrescu, I. Finocchi, and G. Liotta. Visualizing Algorithms over the Web with the Publication-driven Approach. In D. Wagner, editor, *Workshop on Algorithm Engineering(Proc. WAE '00)*, Lecture Notes Comput. Sci. Springer-Verlag, 2000.
2. C. Demetrescu, E. Di Giacomo, I. Finocchi, and G. Liotta. Visualizing Geometric Algorithms with WAVE: System Demonstration. In *Fall Workshop on Computational Geometry, Stony Brook NY 2000*, 2000.
3. G. Di Battista, P. Eades, R. Tamassia, and I. G. Tollis. *Graph Drawing*. Prentice Hall, Upper Saddle River, NJ, 1999.