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An Application of Parallel Interval Techniques to Geophysics

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I. Geophysical Problem

In order to find out where the deposits (of oil, minerals, etc) are located, we must know the 3–D structure of the area. To determine this structure, we can dig several wells, place sound- and impulse-generating devices and sensors in them, generate the impulses, and measure the responses. These measurement results need to be further processed: e.g., the time that it took the sound to travel from the generator to the sensor depends on the properties of the media in between the generator and the sensor.

The problem of reconstructing the 3–D structure from these measurements is therefore similar to the medial tomography problem, and it is therefore called *geophysical tomography* [2].

II. It Is Necessary To Estimate Errors

The measurements are imprecise, so, the results of this reconstruction are also imprecise. So, it is necessary to determine the accuracy of these results.

III. Sequential Methods

To determine the accuracy of geophysical tomography methods, in [2], the general methods of error estimation from [3] have been implemented on a sequential computer.

IV. Parallel Techniques

We have implemented algorithms from [2] in parallel, using a C–based parallel language SR [1].

This program is implemented on a network of SUN SPARC stations. The implementation is *flexible* in the sense that the user can tell it which machines are available at present, and it will automatically distribute the computations between these available machines.

References

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