

An empirical approach for the evaluation of haptic algorithms

Supplementary material

RAYMAEKERS, Chris; DE BOECK, Joan & CONINX, Karin (2005) An empirical approach for the evaluation of haptic algorithms. In: Proceedings of the First Joint EuroHaptics Conference and Symposium on Haptic Interfaces for Virtual Environment and Teleoperator Systems (WorldHaptics 2005). p. 567-568..

DOI: 10.1109/WHC.2005.21

Handle: <http://hdl.handle.net/1942/7301>

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The number of haptic algorithms has been growing over the past few years. However, little research has been performed in evaluating these algorithms. This poster provides a discussion of how force-feedback algorithms can be empirically evaluated for correctness and performance. More information can be found in our paper in the conference proceedings.

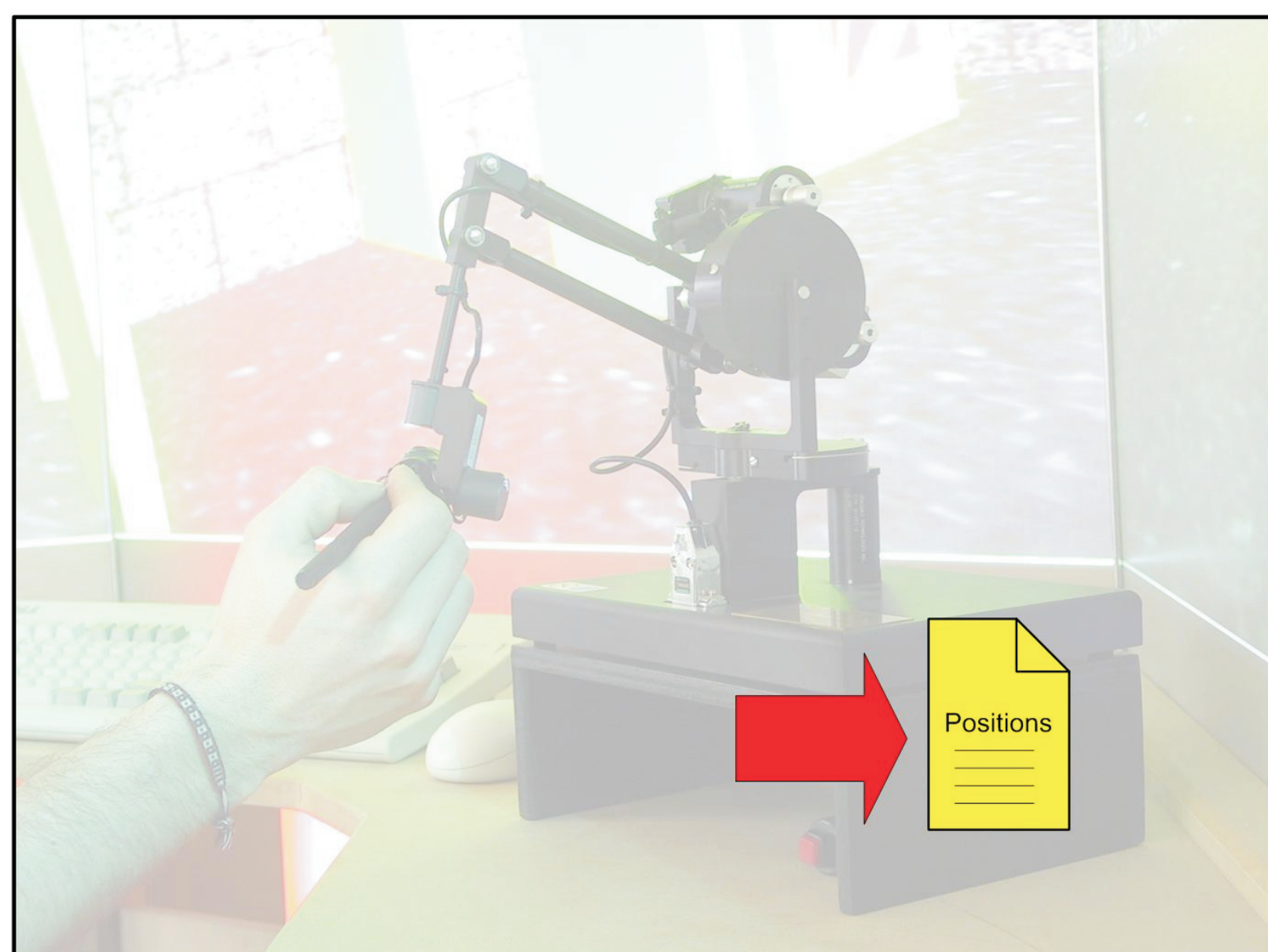
### Existing Performance Comparison Methodologies

- Theoretical comparison: calculation of time complexity
- Overload test: try to simulate as much triangles/objects as possible, until the haptic loop breaks down.
- Haptic Load Tool: compare the haptic load, read from a graphical tool

### Problem With Current Methods

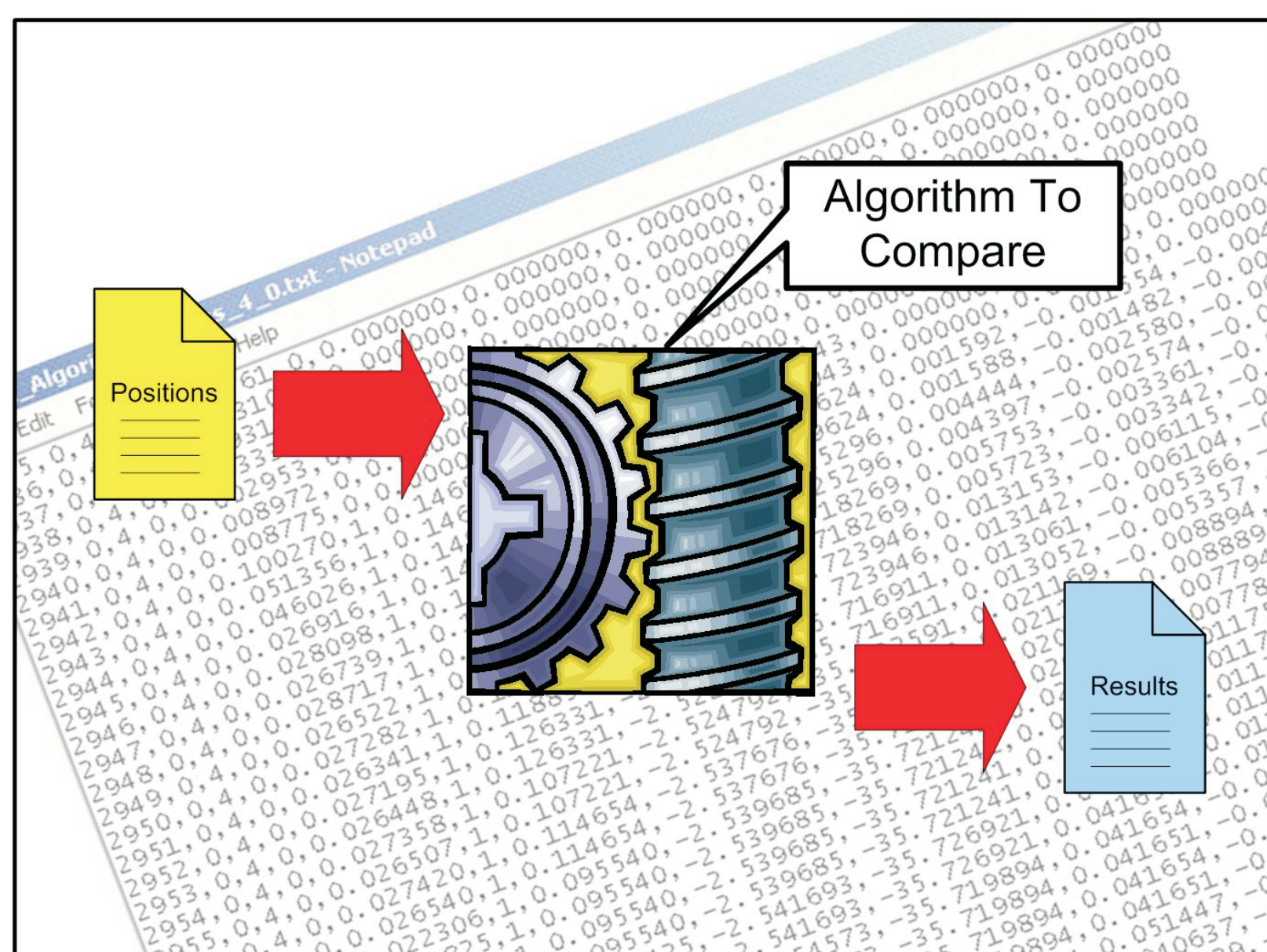
- Algorithms are compared with different data
- No exact numerical data to compare
- Tests often unintentionally measure scene graph overhead

## Our Approach to Compare Haptic Algorithms



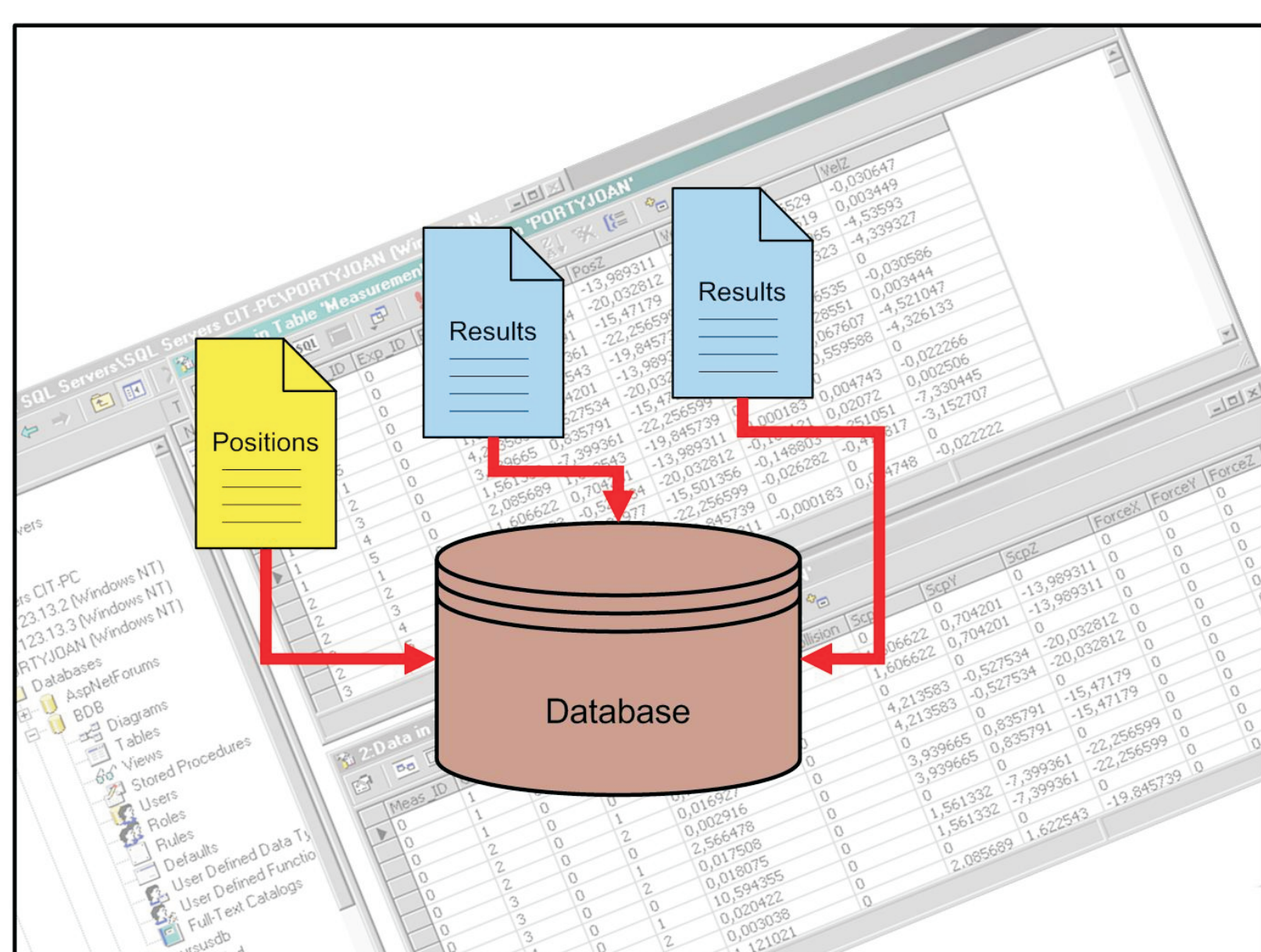
### Gather Real-life Data

In a first step, a given number of users explores a given number of objects for a certain time using a given reference algorithm. Each execution of the haptic loop, the pointer's position and velocity is stored to a file. The results (contact point and rendered force) of the algorithm are saved to a result file.



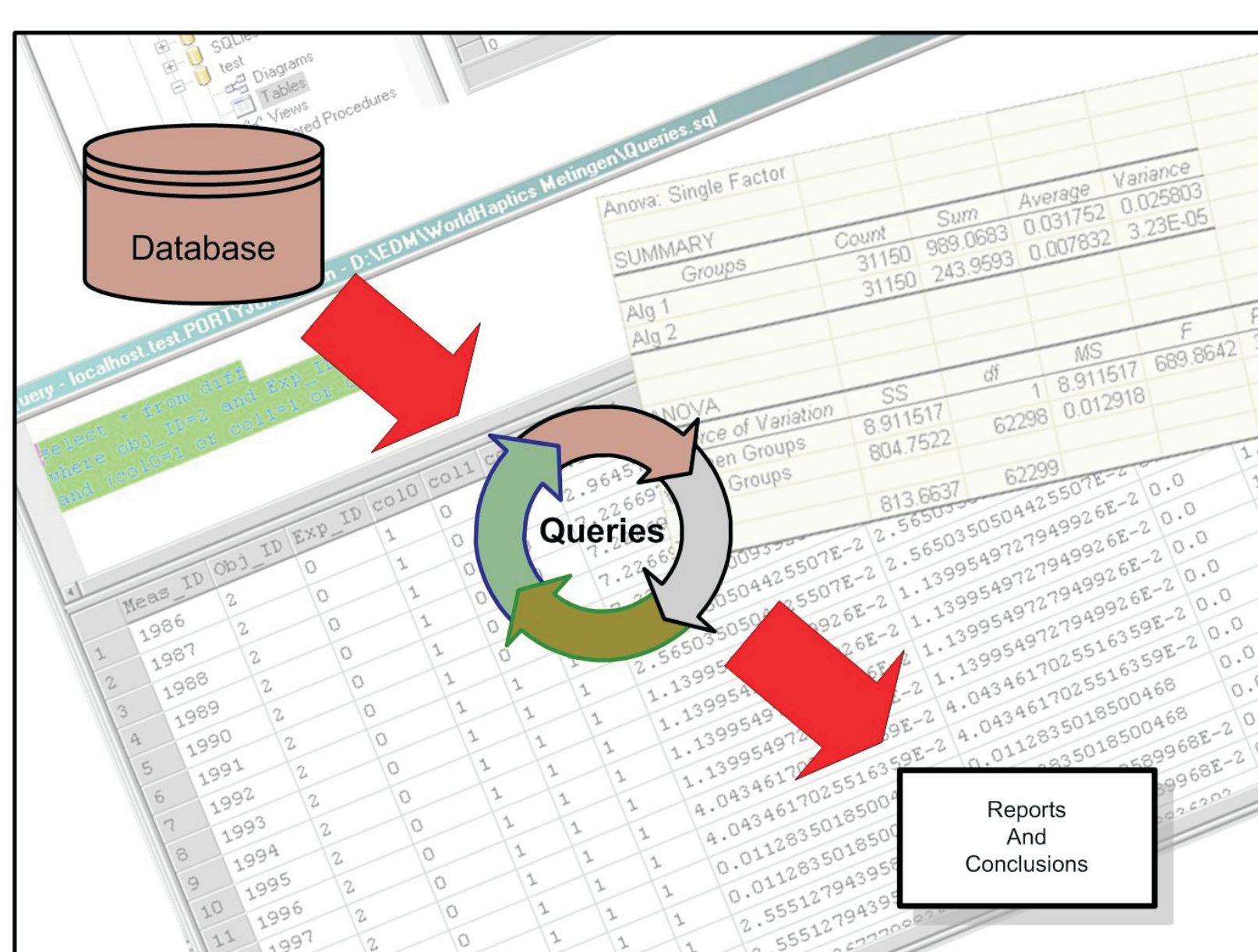
### Apply Data to Other Algorithms

The original position file is processed by the new algorithm. The haptic algorithm's result (contact point and rendered force) are stored in a result file.



### Store Data in Database

Since each exploration of a single object by a single user for just a few seconds already results in several thousands of data points, all the result files and the positions file are stored to a database. This allows us to easily query and select data from this huge amount of data.



### Apply Numerical/Statistical Operations

The conclusions about the correctness and performance of the algorithms, can be drawn by analyzing the data. This can be done directly using the build-in database support, or by exporting a selection to a statistical application.