DEVELOPMENT OF THE TÜBINGEN
NEURO-OPHTHALMOLOGICAL PERIMETRIC DATABASE

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Introduction

This project is aimed at the development of a computer-based, primary neuro-ophthalmological perimetric database for research, education and patient care. It is divided into three phases:

1. The perimetric examination protocol was analyzed and optimized through computer support. Each perimetric finding is ‘manually’ classified by a specialist according to the type of visual field defect (e.g., homonymous scotomas, retinal nerve fiber bundle defects, etc.) and its reliability rating. Results of this phase have reduced the administrative effort, created a paperless digital archive and allowed faster access for scientific evaluation.

2. Perimetric results obtained before the development of the new protocols are introduced into the electronic database by scanning, digitizing and classifying the perimetric printouts (as mentioned above). Using these procedures, former automated perimetric results of more than 10,000 patients with primary neuro-ophthalmological pathologies will be implemented into the database.

3. The manual classification will be complemented assisted by an expert system2, which is based on a neural network.

With present computer power and development tools, it is possible to rebuild the existing Tübingen perimetric archive of printouts into a computer-based database. A pilot project demonstrated that it is possible to scan and digitize automated perimetric findings. For scientific evaluation, each perimetric finding is classified according to the type of visual field defect. In addition, the final diagnosis is stored in the database.

Methods

The application is designed like a two-phase client/server model using Borland Delphi 3.0 as a developmental tool and Interbase as the database system3-7. The Borland Database

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The expert system is especially promising since the comparatively high density of test point locations enables an exact description of the extent, form and position of scotomas. The purpose of the database is to support the ophthalmologist in the interpretation and differential diagnosis of perimetric findings.

Using the database results already in existence, we were able to test the first prototype of the expert system at the University Eye Hospital in Tübingen. The initial results of this system, with classification of straight-forward perimetric findings, look promising.
Fig. 2. Computer configuration.
Fig. 3: Visual field classification frequency distribution ($n=2605$).
Fig. 4. Diagnosis frequency distribution for the visual field finding 'nerve fiber bundle defect'; the column 'others' represents cases with frequency values of <1% each.
References

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