Datasheet of the IKTA4/055 project

I. *Machine learning and its application to speech impediment therapy*

Project start: November 15, 2001, duration: 24 months.

Amount of support: KHUF 28 700, total project cost: KHUF 49 700.

Project leader: ***Kocsor András***
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Project URL: <***http://www.inf.u-szeged.hu/speech***>

II. Consortium members (number of members = **3**, the first member is the project co-ordinator)

no	*name*	*support*	*total cost*
1.	University of Szeged, Department of Informatics	KHUF 18 700	KHUF 29 700
2.	University of Szeged, Teacher Training School	KHUF 5 000	KHUF 10 000
3.	Foster Home, Dormitory, Nursery and Elementary School (for deaf children)	KHUF 5 000	KHUF 10 000

III. Public presentations

No presentation is available.

IV. Goals of the project

The project consists of two main parts: a research part and an application part. The research part will be devoted to investigating modern machine learning techniques and their applicability to speech recognition. Besides machine learning algorithms we also plan to study and develop so-called feature-space transformation algorithms, which normally improve recognition performance when applied prior to learning. The linear form of these transformations is well known, but there is now a new area of study that looks at the construction of a non-linearized analogue of these algorithms using the so-called Kernel idea.

We plan to carry out detailed research on these algorithms and their applications to phoneme recognition. We also have a special transformation method called 'Springy Discriminant Analysis' which requires further investigation.

We shall work with the following learning methods:

Artificial Neural Network,

Gaussian Mixture Model,

Support Vector Machine,

Projection Pursuit Learner.

Linear transformations to be implemented and studied:

Principal Component Analysis,

Independent Component Analysis,

Linear Discriminant Analysis,

Springy Discriminant Analysis

Non-linear algorithms we intend to investigate:

Kernel Principal Component Analysis,

Kernel Independent Component Analysis,

Kernel Linear Discriminant Analysis,

Kernel Springy Discriminant Analysis.

We will also implement a simple hearing model to improve the speech processing part of the project.

The other main part of the project is an application that makes use of the above algorithms. The software is called "EasySpeech" ("BeszédMester"), and its purpose is to assist in the speech training of hearing-impaired children and those children who have pronunciation and reading problems. The program aims to provide real-time visual feedback of the phonemes just pronounced, based on the speech recognition algorithms. We will also develop methodologies for teachers so as to guide them in the proper application of the software. Both the software and the methodologies will be freely available to every school upon request.

We should also mention that since the machine learning algorithms are based on statistical methods, the project also includes a large speech database recorded from children with the above-mentioned handicaps.

V. Project results (in case of finished projects)

The project is not finished.

VI. Data on consortium members (number of members = **3**)

1. ***University of Szeged, Department of Informatics*** (co-ordinator)

   URL: <***http://www.inf.u-szeged.hu/speech***>

   Support for the co-ordinator: KHUF 18 700, and its total cost: KHUF 29 700.
   Contract number: .

   Team leader: ***Kocsor András***
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2. ***University of Szeged, Teacher Training School***

   URL: <***http://www.jgytf.u-szeged.hu***>

   Support for the consortium member: KHUF 5 000, and its total cost: KHUF 10 000.
   Contract number: .

   Team leader: ***Bácsi János***
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3. ***Foster Home, Dormitory, Nursery and Elementary School (for deaf children)***

   URL: <>

   Support for the consortium member: KHUF 5 000, and its total cost: KHUF 10 000.
   Contract number: .

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