Vision-based Integrated Systems Adaptive to Task and Environment with Cognitive abilities

From 2002-03-01 to 2005-02-28

Project details

<table>
<thead>
<tr>
<th>Total cost:</th>
<th>Topic(s):</th>
</tr>
</thead>
<tbody>
<tr>
<td>EUR 1 064 917</td>
<td>2001-4.2.1 - Real time distributed systems</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EU contribution:</th>
<th>Funding scheme:</th>
</tr>
</thead>
<tbody>
<tr>
<td>EUR 989 695</td>
<td>CSC - Cost-sharing contracts</td>
</tr>
</tbody>
</table>

Coordinated in: Germany

Objective

Current Computer Vision systems do not meet important criteria such as cognitive performance, adaptability, robustness, run-time efficiency, and cost-effective development. Thus the spectrum of possible applications is restricted considerably. The project will tackle this weakness by the development of generic cognitive vision architecture, which can be adapted automatically to underlying tasks and environments. It includes novel algebraic means for image and shape representation as well as approaches of multi cue integration for describing hierarchical inter- and intra-image linkages, and these will be based on novel mechanisms of dynamic neural network learning. Cognitive visual competences can be learned including detection of 3D objects in images and attentive object/situation analysis. They are needed in the sample application Skillful Robot Arm which has been chosen for measuring the success under real-world conditions.

Objectives:
The overall objective of the proposed project is to design a learning-based cognitive vision architecture and to implement essential generic components for the automatic adaptation to underlying tasks and environments. The objectives include adequate representation schemes for multi-dimensional images and object shapes, reliable feature extraction and multi cue integration, dynamic adaptation and learning mechanisms, and their specific use for the detection of 3D objects in images and attentive object/situation analysis. These novel techniques will be exploited in the sample real-world application Skillful Robot Arm, which should be equipped with high-level cognitive competences such as object removal from bins, and must rely on robust behaviours of the cognitive vision system as a whole and consider real-time constraints.

Work description:
The project will last 36 months and will be organised in seven work-packages (WPs).
Workpackage WP1 is devoted to project management, which includes permanent administrative and technical duties and permanent inter-project communication.
The aim of workpackage WP2 is to keep a common project infra-structure by installing hardware and common software platforms in the very beginning, then specifying and implementing common software interfaces throughout all project phases, and finally consolidating the user interfaces in the last phase.
The goal of workpackage WP3 is to design novel representation schemes for images and shapes which enable the integration of multiple local cues and the bridging of different abstraction levels and thus will have enough descriptive power to solve cognitive vision tasks.
Workpackage WP4 is devoted to the detection of task-related objects in colour or range images which is based on...
designing and developing algorithmic learning components for automatically learning or adapting appropriate operators involved in the detection method.

Workpackage WP5 is devoted to task-adaptive attentive object and situation analysis in colour or range images which results in a purposive geometric description of relevant objects and object-relations including actoric information just as required to treat a certain Cognitive Vision application.

The aim of workpackage WP6 is to make use of all generic components in the sample application Skillful Robot Arm, which will involve automatic learning and/or adaptation of essential methods to yield task-solving behaviours in the actual environment.

Workpackage WP7 is responsible for disseminating the final results to the research community at large and to industries, i.e. demonstrating the results in tutorials, and organizing an international workshop for leading-edge researchers and practitioners from industries.

Milestones:
PM 20: Computational modules which produce representations (pictorial, spatial) of several object types using multivector-/tensor-based methods; algorithmic learning modules for localization/recognition of objects in different real-world environments.
PM 29: Computational modules for task-adaptive object/situation analysis of several object/situations types in different environments.
PM 36: A cognitive vision architecture adaptable to sub-tasks involved in the Skillful Robot Arm.

Coordinator

CHRISTIAN-ALBRECHTS-UNIVERSITAET ZU KIEL
OLSHAUSENSTRASSE 40
24098 KIEL
Germany

Administrative contact: Josef PAULI
Tel.: +49-43-1560484
Fax: +49-43-1560481
E-mail

Participants

ISRA VISION SYSTEMS AG
INDUSTRIESTRASSE 14
64297 DARMSTADT
Germany

Administrative contact: Stephan WIENAND
Tel.: +49-61519480
E-mail

LINKOEPingS UNIVERSITet
CAMPUS VALLA
581 83 LINKOEPing
Sweden

Administrative contact: Klas NORDBERG
Tel.: +46-13-281634
Fax: +46-13-138526
E-mail

Subjects

Information Processing and Information Systems - Innovation and Technology Transfer - Telecommunications

Last updated on 2005-06-13
Retrieved on 2016-01-13

© European Union, 2016