

Ontology based Meta Data Search in the context of E-Learning

*Diploma thesis by: Dennis Fenchel
Supervisor: Eicke Godehardt*

The amount of information in the Internet grows from day to day. Therefore the importance of search engines is growing. Because the search engine can't know of connections between the search criterions, the result list often contains data, which wasn't wanted by the User. To give the Computer the possibility to understand such connections, ontologies can be used.

In this work, we researched how ontologies could be used to refine the results of existing search engines. Multiple concepts were made and the pros and cons were considered. On the example of the learning platform WiBA-Net an Application was implemented, which can change search queries with the help of an ontology.

About the component-oriented design of mobile agents and their behavior

*Diploma thesis by: Jan Hävecker
Supervisor: Dipl.-Ing. Ulrich Pinsdorf*

Many research and development efforts in the past focussed on providing software infrastructures with a view to nd applications based on mobile agents. There are, however, comparatively few dealing with the development of an agent itself and its behaviour. Some existing works handle general methodologies and generic architectures up to specific frameworks. It is quite obvious, however, that there is a general lack of reuseability as to the development of mobile agents and their behaviour. This shortcoming applies to the reuseability of methods and techniques, as well as to the results arising from their application.

The thesis proposes a concept by which mobile agents and their behaviour are designed in a reusable manner. Central focus of this concept has been placed on the reuseability of results which originate from its application. Single components are to be constructed in such a way that they may be used in various different contexts.

The concept developed is made up of a state-oriented design method and a component-oriented framework for implementing the models designed. A suitable interpretation of the concept of the hierarchical state machine should enable the combination of both - paradigms of component-oriented software engineering - and state-oriented modelling, into a context related to mobile agents. Application of this approach bridges the gap between known models of agent-design and the implementation level. On the other hand an independent application of solutions in the context of mobile agents is rendered possible.

For a better understanding the thesis contains an introduction into the basics - this includes an overview of the main topics of agent-oriented computer science. Moreover a brief introduction into the statecharts of the UML. Some existing approaches to designing and modelling (mobile) agents are introduced and analysed.

The concept proposed in the thesis and its implementation are presented in detail. First of all requirements of the concept are listed and substantiated, followed by an analysis of the requirements regarding state-oriented modelling. The solution is derived from this analysis. It is first of all described on a conceptual level and then in the form of a technical description of the components relevant for the implementation. Finally the actual implementation of this concept for the platform SeMoA is demonstrated.

Interoperability and Standards of Mobile Agents

*Diploma thesis by: Omar Alaoui
Supervisor: Dipl.-Ing. U. Pinsdorf*

The ability of mobile agents to reason and act autonomously should help this technology to get through to the market. However, the lack of interoperability between different agent systems is a major obstacle for their further spreading. Almost each mobile agent system is founded in research activities and therefore has its specific scientific focus. As a consequence each system has its own strength and benefits. Interoperability can help to combine these individual advantages and push the technology as a whole to the market.

This diploma thesis evaluates and discusses the general approaches for interoperability for (mobile) agent systems. It examines if the approaches are suitable for an efficient and secure interaction between the different agent systems. The focus of this work is the interoperability on a runtime level and not the well-

understood and standardized agent communication. First, the thesis gives an overview of the related work and introduces the different methods for interoperability. Next, these approaches are examined individually and estimated with regard to their possibilities. This evaluation is based on suitable criteria, which were adapted to the special needs of the agent technology. Based on these experiences the thesis derives a list of requirements for a suitable interoperability approach and summarizes the lessons learned. The applicability of interoperable agent systems is shown by an implementation for a demonstration. This software combines different agent platforms to a single application. Special attention is given to the integration and interoperability of heterogeneous components and techniques.

This diploma thesis helps to understand mobile agent interoperability and gives a good overview on existing approaches. The establishment of mobile agent interoperability may help to push the technology to the market.

Metrics for Quality Assessment of Watermarked 3D Polygonal Models

Diploma thesis by: Jennifer Prasiswa
Supervisor: Wolfgang Funk

Non-perceivability is of great importance for digital watermarking, thus it would be desirable to obtain objective measures of visual quality. These measures are needed in simplification of 3D models and in compression as well. In an image-based and an animation-based experiment, human perception of distortions caused by the Sculpting Based Watermarking algorithm by Benedens was recorded. Two experimental methods were utilised: »two alternative choice testing« and a rating test based on the »double-stimulus impairment scale method«. An online evaluation method for the experiments was developed, it proved to be effective and convenient for both the participants and the experimenter. For the configurations chosen in accordance to the default configuration the watermarking algorithm proved to be non-transparent for both experimental designs. The perception rates were higher for still images than for the animated sequences. Results also revealed a high dependency of the perceived quality on the chosen model and the key used during watermarking. Furthermore, several metrics were introduced and their ability to predict perceived quality was evaluated. The metrics differed in effectiveness depending on the choice of stimuli. The image-based Lindstrom metric was effective

for still images, much less for animations. The best overall results were achieved by two geometric metrics, the symmetric Hausdorff distance giving the maximal distance between original and marked mesh and the root mean square Hausdorff distance. These results confirm previous experiments, where geometric metrics also proved to be effective for small quality differences. An accurate correspondence between perceived and objective quality could not be established as results varied between models.

Polygonübergreifende Verankerung zur Lichtsimulation

Study thesis by: Robert Rapljenovic
Supervisor: Wolfram Kresse

An important step in the Radiosity procedure is the removal of visual artifacts. Artifacts caused by T-Vertices can be eliminated within a subdivided polygon, but at the borders the problem was not efficiently solved yet. The Radiosity method is not only of theoretical interest in education and research, but is applicable also in the industry. Here, usually much more detailed and complex scenes are computed than within the academic scope where the radiosity procedures are developed. This leads to long computation times of the simulations. Therefore consideration to this aspect must be given during the conceptual design of Radiosity components. This study concerns itself with the efficient removal of the T-Vertices artifacts by the use of the patch points. Thus no new data structures are invented, but the already existing are used in a new and efficient manner.

Algorithm for Comparison of three-dimensional Facedata

Diploma thesis by: Kai Brücher
Supervisor: Henning Daum

Starting from three-dimensional face data, which has been acquired from a 3D-scanner based on structured light, a recognition-algorithm has been developed.

At first the 3D-scans are normalized in pose with a given registration-algorithm. The normalized 3D-scans are then compared with different distance measures. Therefore the euclidean distance and the vertexnormals are used to measure the similarity of two persons. Regions, which are especially interesting for 3D face recognition like the nose and the forehead, because of invariance against mimic, are emphasized by the algorithm. The influence of other disturbing factors

like eyeglasses, a beard, a cap, etc. are also examined.

For a better judgement of the results from the developed three-dimensional face recognition algorithm a two-dimensional face recognition is used as a benchmark. For a dataset with 19 different persons a rank-one-recognition of 100% has been achieved with the given registration-algorithm.