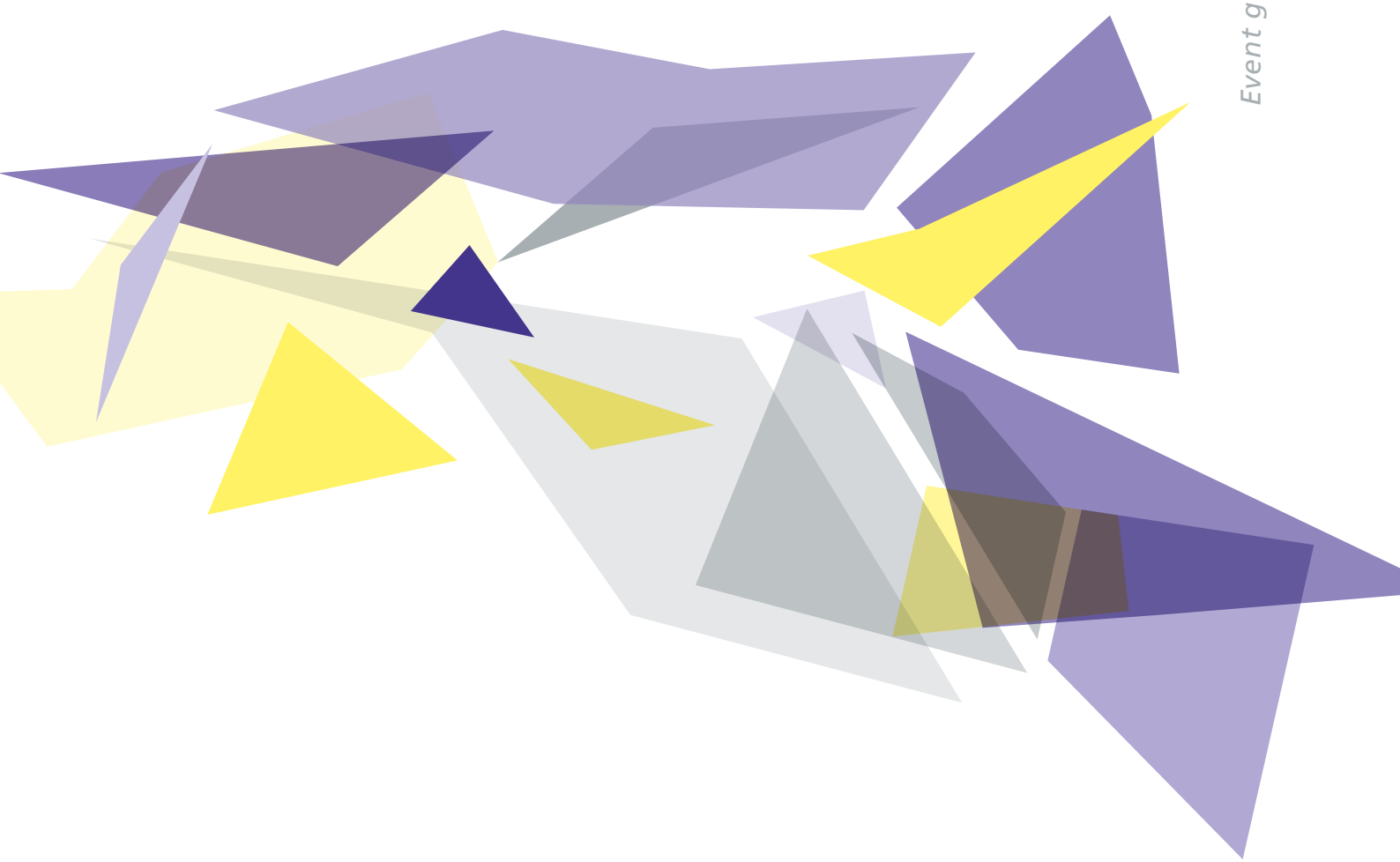
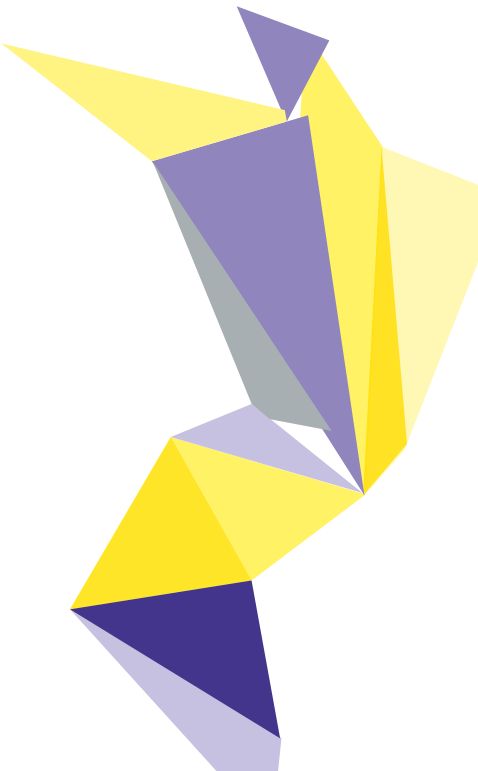
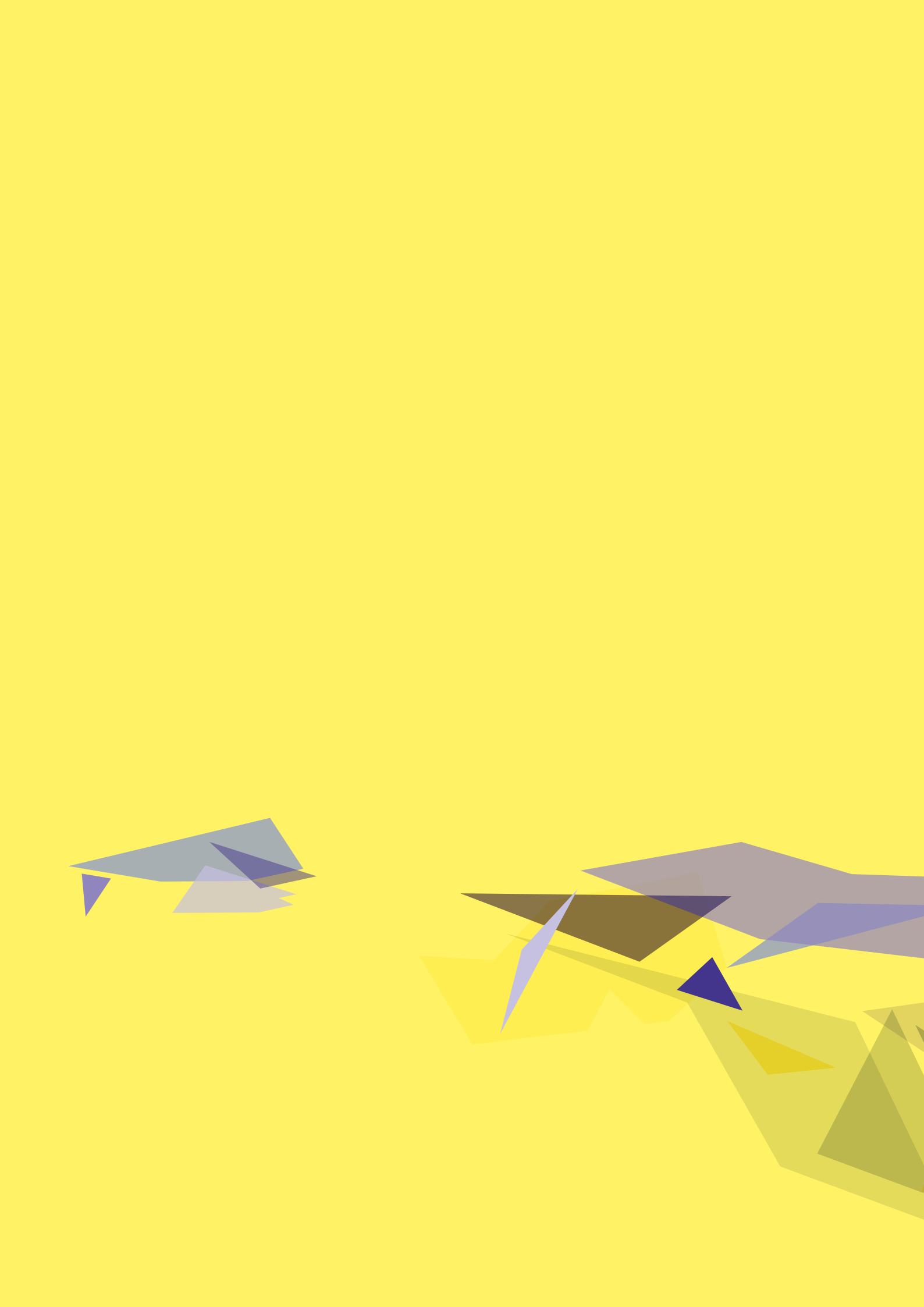
Event guide



WELCOME
TO THE
21ST DARMSTADT
COMPUTER GRAPHICS NIGHT
THURSDAY, DECEMBER 05, 2019



Fraunhofer
IGD



CONTENTS
PROGRAM

GRADUATION

THIS SECTION HIGHLIGHTS, IN ALPHABETICAL ORDER, ALL VISUAL COMPUTING DISSERTATIONS PUBLISHED BETWEEN DECEMBER 1, 2018 AND OCTOBER 30, 2019.

JIAN CUI

(On the Spine)

NANYANG TECHNOLOGICAL UNIVERSITY

TITLE OF RESEARCH

MID-AIR HAND INTERACTION WITH OPTICAL TRACKING FOR 3D MODELLING

CUI JIAN

2018

CUI JIAN

SCHOOL OF COMPUTER SCIENCE AND ENGINEERING

2018

5

ABSTRACT

Compared to common 2D interaction done with mouse and other 2D-tracking devices, 3D hand tracking with low-cost optical cameras can provide more degrees of freedom, as well as natural gestures when shape modeling and assembling are done in virtual spaces. However, though quite precise, the optical tracking devices cannot avoid problems intrinsic to hand interaction, such as hand tremor and jump release, and they also introduce an additional problem of occlusion. This thesis investigates whether interaction during 3D modeling can be improved by using optical sensors so that 3D tasks can be performed as natural as in real life and as efficient as when using common 2D-tracking based interaction while still minimizing the intrinsic problems of precise hand manipulations and optical problems.

After surveying the relevant works and analyzing technical capabilities of the commonly available optical sensors, two approaches are thoroughly investigated for the natural mid-air hand interaction in precise 3D modeling – they are collision-based and gesture-based interaction. For collision-based methods, a set of virtual interaction techniques is proposed to realistically simulate real-life manipulation and deformation with one and two hands. For gesture-based interaction, a core set of interaction techniques is also devised which allows natural real-life interaction ways to be used. In addition, algorithms are proposed for both collision-based and gesture-based interaction to enhance the precision while minimizing the problems of hand tremor and jump release. However, the results show that virtual interaction designed with collision-based methods is always slower than real-life interaction due to missing force feedback. Although common gesture-based interaction is less affected by its

problem and its efficiency can be comparable to real-life interaction, it still cannot completely get rid of the problems of occlusion and jump release.

Eventually, a new method of gesture-based interaction is proposed to use hands in a way similar to how it is done when playing the Theremin – an electronic musical instrument controlled without physical contact by hands of the performer. It is suggested that the dominant hand controls manipulation and deformation of objects while the non-dominant hand controls grasping, releasing and variable precision of interaction. Based on this method, a generic set of reliable and precise gesture-based interaction techniques is designed and implemented for various manipulation and deformation tasks. It is then proved with the user studies that for the tasks involving 3D manipulations and deformations, the proposed way of hand interaction is easy to learn, not affected by the common problems of hand tracking, as well as more convenient and faster than common 2D interaction done with mouse for some 3D tasks.

JOHANNES EDELSBRUNNER

Johannes Edelsbrunner, Dipl.Ing.

Domain Specific Methods for Procedural Modeling of Historical Architecture

8

Doctoral Thesis

to achieve the university degree of

Doctor of Philosophy

PhD degree programme: Computer Science

submitted to

Graz University of Technology

Supervisor

Priv.-Doz. Dipl.-Inform. Dr.-Ing. Sven Havemann

Co-Supervisor

Assoc.-Prof. Priv.-Doz. Ph.D. M.Eng. Alexei Sourin

Institute of Computer Graphics and Knowledge Visualisation
Head: Univ.-Prof. Dipl.-Ing. Dr.techn. Wolf-Dietrich Fellner

Graz, February 2018

ABSTRACT

This thesis is concerned with the question of how to efficiently model and represent historic buildings in the computer. Since detailed 3D modeling can often require considerable amounts of effort, automation is a natural goal to strive for. This automation can be provided by procedural modeling. Common procedural modeling techniques excel at the generation of a vast amount of simple buildings for entire virtual cities. While simple box-shaped buildings can be easily described, for more complex buildings such as complex historic buildings procedural techniques can be used only sparely.

Virtually generated buildings and cities are increasingly demanded by virtual worlds, movies, and video games. Modeling them in detail requires a huge amount of resources and historic buildings are one part that is not well covered today. Historic buildings have different parts that need different modeling techniques.

This thesis investigates some of those parts and tries to find new answers on how to model them procedurally. The introduced modeling techniques comprise a technique to model complex roof landscapes of historic cities, a technique to procedurally model the geometry of round building parts, and a technique to capture the forms of ornamental decorations in historic buildings. Further it compares domain specific methods from software design to procedural modeling techniques and draws comparisons there. The basis for all the research forms a common programming language that is designed for procedural modeling.

ROMAN GETTO

Parametric Procedural Models for 3D Object Retrieval, Classification and Parameterization

dem Fachbereich Informatik
der Technischen Universität Darmstadt
vorzulegende

DISSERTATION

zur Erlangung des akademischen Grades eines
Doktor-Ingenieurs (Dr.-Ing.)
von

M.Sc. Roman Getto
geboren in Heidelberg, Deutschland

Referenten der Arbeit:	Prof. Dr. techn. Dieter W. Fellner Technische Universität Darmstadt Prof. Dr. rer. nat. Tobias Schreck Technische Universität Graz
Tag der Einreichung:	12/02/2019
Tag der mündlichen Prüfung:	05/04/2019

Darmstädter Dissertation
D 17

ABSTRACT

The amount of 3D objects has grown over the last decades, but we can expect that it will grow much further in the future. 3D objects are also becoming more and more accessible to non-expert users. The growing amount of available 3D data is welcome for everyone working with this type of data, as the creation and acquisition of many 3D objects is still costly. However, the vast majority of available 3D objects are only present as pure polygon meshes. We arguably can not assume to get meta-data and additional semantics delivered together with 3D objects stemming from non-expert or 3D scans of real objects from automatic systems. For this reason content-based retrieval and classification techniques for 3D objects has been developed.

Many systems are based on the completely unsupervised case. However, previous work has shown that there are strong possibilities of highly increasing the performance of these tasks by using any type of previous knowledge. In this thesis I use procedural models as previous knowledge. Procedural models describe the construction process of a 3D object instead of explicitly describing the components of the surface. These models can include parameters into the construction process to generate variations of the resulting 3D object. Procedural representations are present in many domains, as these implicit representations are vastly superior to any explicit representation in terms of content generation, flexibility and reusability. Therefore, using a procedural representation always has the potential of outclassing other approaches in many aspects. The usage of procedural models in 3D object retrieval and classification is not highly researched as this powerful representation can be arbitrary complex to create and handle. In the 3D object domain, procedural models are mostly used for highly regularized structures like buildings and trees.

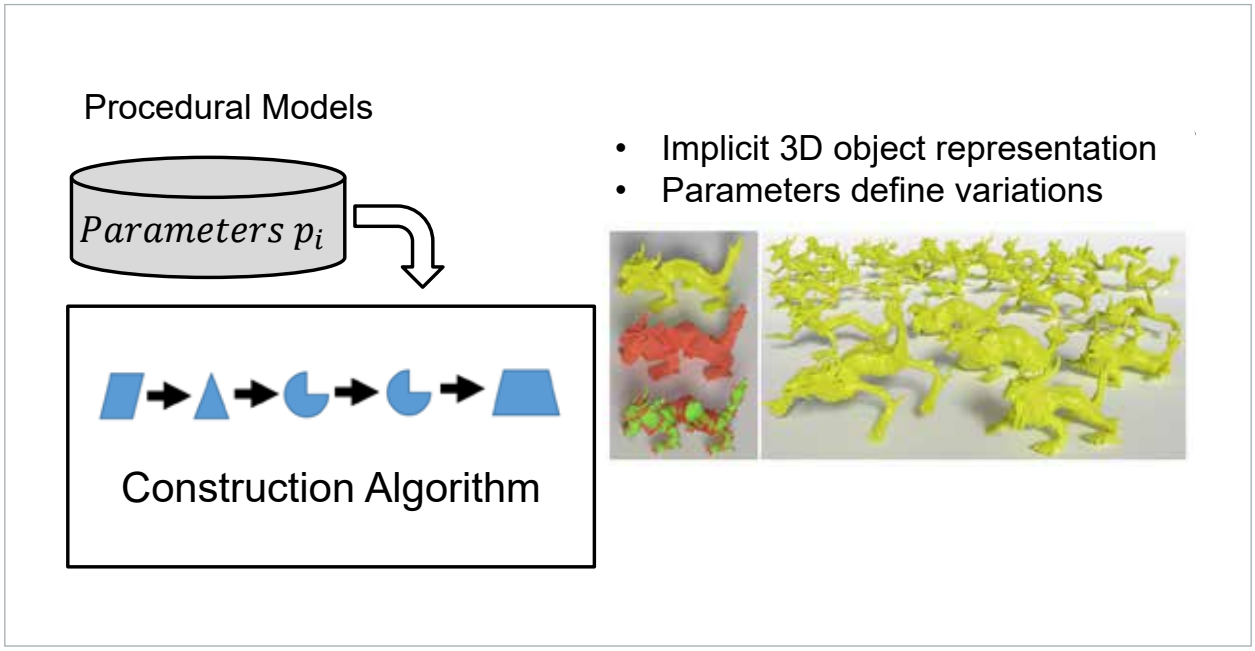
However, Procedural models can deeply improve 3D object retrieval and classification, as this representation is able to offer a persistent and reusable full description of a type of object. This description can be used for queries and class definitions without any additional data. Furthermore, the initial classification can be improved further by using a procedural model: A procedural model allows to completely parameterize an unknown object and further identify characteristics of different class members. The only drawback is that the manual design and creation of specialized procedural models itself is very costly. In this thesis I concentrate on the generalization and automation of procedural models for the application in 3D object retrieval and 3D object classification.

For the generalization and automation of procedural models I propose to offer different levels of interaction for a user to fulfill the possible needs of control and automation. This thesis presents new approaches for different levels of automation: the automatic generation of procedural models from a single exemplary 3D object. The semi-automatic creation of a procedural model with a sketch-based modeling tool. And the manual definition a procedural model with restricted variation space. The

second important step is the insertion of parameters into the procedural model, to define the variations of the resulting 3D object. For this step I also propose several possibilities for the optimal level of control and automation: An automatic parameter detection technique. A semi-automatic deformation based insertion. And an interface for manually inserting parameters by choosing one of the offered insertion principles. It is also possible to manually insert parameters into the procedures if the user needs the full control on the lowest level.

To enable the usage of procedural models directly for 3D object retrieval and classification techniques I propose descriptor-based and deep learning based approaches. Descriptors measure the difference of 3D objects. By using descriptors as comparison algorithm, we can define the distance between procedural models and other objects and order these by similarity. The procedural models are sampled and compared to retrieve an optimal object retrieval list. We can also directly use procedural models as data basis for a retraining of a convolutional neural network. By deep learning a set of procedural models we can directly classify new unknown objects without any further large learning database. Additionally, I propose a new multi-layered parameter estimation approach using three different comparison measures to parameterize an unknown object. Hence, an unknown object is not only classified with a procedural model but the approach is also able to gather new information about the characteristics of the object by using the procedural model for the parameterization of the unknown object.

As a result, the combination of procedural models with the tasks of 3D object retrieval and classification lead to a meta concept of a holistically seamless system of defining, generating, comparing, identifying, retrieving, recombining, editing and reusing 3D objects.



NANYANG TECHNOLOGICAL UNIVERSITY

Frequency Analysis and Online Learning in Malware Detection

PhD Dissertation

By

Huynh Ngoc Anh

Supervisor: Dr. Ng Wee Keong
Co-supervisor: Dr. Jörn Kohlhammer

School of Computer Science and Engineering

A thesis submitted to the Nanyang Technological University
in partial fulfillment of the requirement for the degree of
Doctor of Philosophy

December, 2017

ABSTRACT

Traditional antivirus products are signature-based solutions, which rely on a static database to perform detection. The weakness of this design is that the signatures may become outdated, resulting in the failure to detect new samples. The other approach is behavior-based detection, which aims to identify malware based on their dynamic behavior. Behavior-based detection comes in two approaches. The first approach leverages on common known behaviors of malware such as random domain name generation and periodicity. The second approach aims to directly learn the behavior of malware from data using tools such as graph analytics and machine learning.

Behavior-based detection is difficult because we have to deal with intelligent and highly motivated attackers, who can change their strategy to maximize the chance of getting access to computer networks. We narrow our research to the domain of Windows malware detection and we are particularly interested in two aspects of behavior-based detection: periodic behavior and behavior evolution. Periodic behavior refers to the regular activities programmed by attackers such as periodic polling for server connection or periodic update of the victim machine's status. Behavior evolution refers to the change in behavior of malware over time.

In the **first research direction**, we aim to exploit the periodic behavior for malware detection. The main analysis tool in this direction is Fourier transform, which is used to convert time domain signals into frequency domain signals. This idea is motivated by the fact that it is often easier to analyze periodic signals in the frequency domain than in the original time domain. Using Fourier transform, we propose a novel frequency-based periodicity measure to evaluate the regularity of network traffic. Another challenge in this direction is that, other than malware, most

automatic services of operating systems also generate periodic signals. To address this challenge, we propose a new visual analytics solution for effective alert verification.

In the **second research direction**, we aim to develop adaptive learning algorithms to capture malware samples, whose behavior changes over time. We capitalize on the well-known online machine learning framework of Follow the Regularized Leader (FTRL). Our main contribution in this direction is the usage of an adaptive decaying factor to allow FTRL algorithms to better perform in environments with concept drifts. The decaying factor helps to increasingly discount the contribution of the examples in the past, thereby alleviating the problem of concept drifts. We advance the state of the art in this direction by proposing a new adaptive online algorithm to handle the problem of concept drift in malware detection. Our improved algorithm has also been successfully applied to other non-security domains.

MA JINGTING

SELF-LEARNING SHAPE RECOGNITION IN MEDICAL IMAGES

MA JINGTING

SCHOOL OF COMPUTER SCIENCE AND ENGINEERING

A thesis submitted to the Nanyang Technological University
in fulfillment of the requirement for the degree of
Doctor of Philosophy

2018

ABSTRACT

A massive amount of medical image data, e.g. from Computed Tomography (CT) and Magnetic Resonance Imaging (MRI), is generated from hospitals every day. Biological structure segmentation is very useful to support surgery planning and treatments, as an ideal delineation of the outline of the target object can offer a precise location and quantitative analysis for further clinical diagnoses such as identification of tumorous tissues. However, the large dimension and complex patterns in medical image data make manual annotation extremely time-consuming and problematic. Accordingly, automatic biomedical image segmentation becomes a crucial pre-requisite in practice and has been a critical research issue over tens of years.

However, major challenges exist in medical image segmentation such as the low intensity contrast to surrounding tissues and complex geometry of shape. Moreover, limited amounts of labeled training data give rise to difficulties as well. Numerous approaches have been proposed to mitigate these challenges, from low-level image processing to supervised machine learning techniques. It is worth mentioning that statistical shape models (SSMs) have achieved a remarkable success in a widespread of applications, which parameterize the significant variabilities of biological shapes and adopt the exploited statistics to guide and constrain shape model fitting. Despite the success, SSMs-based segmentation approaches suffer from the limitation that the power of SSMs rises and falls with the quality of training data and geometrical complexity of the target shape. Furthermore, SSMs are sensitive to initialization, especially for small and distorted subjects. Therefore, this thesis aims to derive SSMs that are robust to training data corruption and are able to represent complex patterns. This thesis also aims at addressing the sensitivity of existing SSM frameworks to initialization.

As training data is often corrupted by many factors like inherent noise/artifacts and non-ideal delineations in this thesis, many efforts have been devoted to developing SSMs that are robust to data corruption. First, early attempts proposing an imputation method and weighted Robust Principal Component Analysis (WRPCA) have been made to address arbitrary corruptions under the assumption of linear distribution. Nevertheless, deriving a quality model is still demanding as the shape variance of biological structures may not simply follow Gaussian distribution. To combat this, a kernelized RPCA is proposed to cope with outliers in a nonlinear distribution. The idea is performing the low-rank modeling on the kernel matrix to achieve nonlinear dimensionality reduction, and outlier recovery thereof.

To increase the generality and feasibility, this thesis, furthermore, presents a general nonlinear data compression technique, the Robust Kernel PCA (RKPCA), with the aim of constructing a low-rank nonlinear subspace free of outliers. In terms of evaluation, the proposed RKPCA delivers high performance on not only creating SSMs but also on outlier recovery. Experiments are conducted using two representative datasets, a set of 30 public CT kidneys and a set of 49 internal MRI ankle bones. Embedded into an existing segmentation framework, experimental results show that SSM built with the proposed RKPCA outperforms the state-of-the-art modeling techniques in terms of model quality and segmentation accuracy.

Since SSMs fail to adopt in cases where the target structure occupies a relatively small or distorted area, deep neural networks that remedy this shortcoming are considered thereof. However, redundant background contents in 3D volume may significantly influence the accuracy of deep deep neural networks. Aiming at challenging structures that occupy relatively small areas and have large variances, a novel unified segmentation framework is proposed that incorporates SSM on the top of deep neural network for detailed refinement. The motivation is aggregating both spatial and intensity based features from a limited amount of data. Globally optimized via Bayesian inference, the segmentation is driven by a dynamic weighted Gaussian Mixture Model (DWGMM) integrating the probability scores from the deep neural network and the shape prior from the SSM. Under a public NIH dataset of CT pancreas, the proposed segmentation framework

achieves the best average Dice Similarity Coefficient compared to the-state-of-the-art approaches.

The majority of this work is based on public tools: the **Medical Imaging Interaction Toolkit (MITK)** for SSMs investigation and analysis and the public library **Keras** for deep neural networks development. All medical image datasets used in this thesis have been validated by clinical experts.

ANDREAS RIFFNALLER-SCHIEFER

Andreas Riffnaller-Schiefer, Dipl.-Ing.

A SUBDIVISION APPROACH TO ISOGEOMETRIC ANALYSIS

ANALYSIS, DESIGN AND SIMULATION

Doctoral Thesis

to achieve the university degree of

Doktor der technischen Wissenschaften

submitted to

Graz University of Technology

Supervisor

Univ.-Prof. Dipl.-Ing. Dr.techn. Dieter W. Fellner

Co-Supervisor

Ass.Prof. M.Sc. PhD Ursula Augsdörfer

Institute of Computer Graphics and Knowledge Visualisation

Graz, April 2019

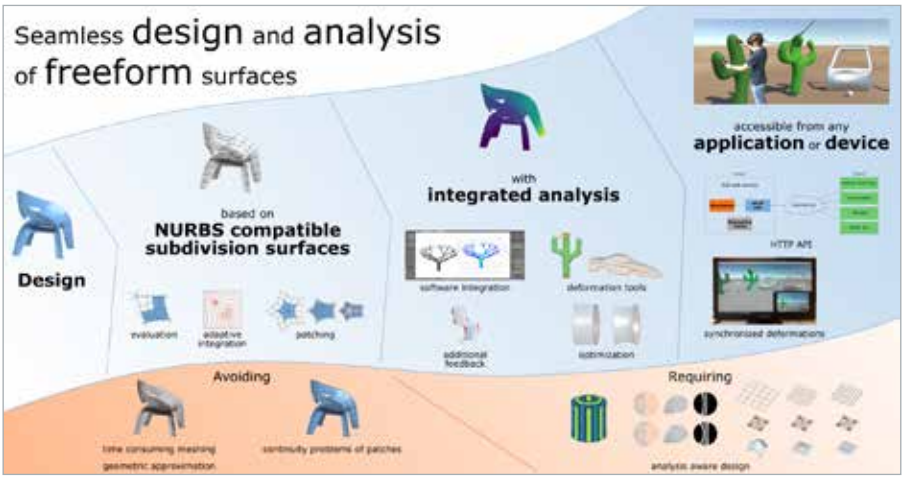
ABSTRACT

Physical products for everyday life are usually designed using computer-aided design (CAD) software. To validate physical properties like structural stability for those digital designs, computer-aided engineering (CAE) software is used to perform different types of analysis and simulations on the virtual objects. Due to their historic development, the tools and methods for design and engineering are based on different geometrical representations to describe the shape of the designed objects. Analysis, therefore, requires a time consuming conversion of the designed geometry.

To overcome this problem, the concept of *isogeometric analysis* was proposed, where the same geometry representation is used for both CAD and CAE. This eliminates the need to convert between different geometry representations for design and analysis.

This thesis explores the use of isogeometric analysis for typical engineering tasks as well as for the design process itself. To closely link design and analysis, the isogeometric concept is extended to a subdivision based surface representation that combines the properties required for reliable engineering design as well as for precise freeform surface design.

The unified analysis platform developed in this thesis provides seamless design and analysis of freeform surfaces, accessible to a wide range of applications and devices. It is used for structural analysis and optimizations of designed shapes, and it is also employed to create new modeling tools for designers and to enable interactive deformation within virtual worlds.



AHMED RABEE AHMED SADIK

Worker-Robot Cooperation and Integration into the Manufacturing Workcell via the Holonic Control Architecture

by

Ahmed Rabee Ahmed Sadik, born on the 9th of September 1984, in Cairo, Egypt

Dissertation zur
Erlangung des akademischen Grades
Doktor-Ingenieur (Dr.-Ing.)
der Fakultät für Informatik und Elektrotechnik der
Universität Rostock

Rostock, Germany
21 August, 2018

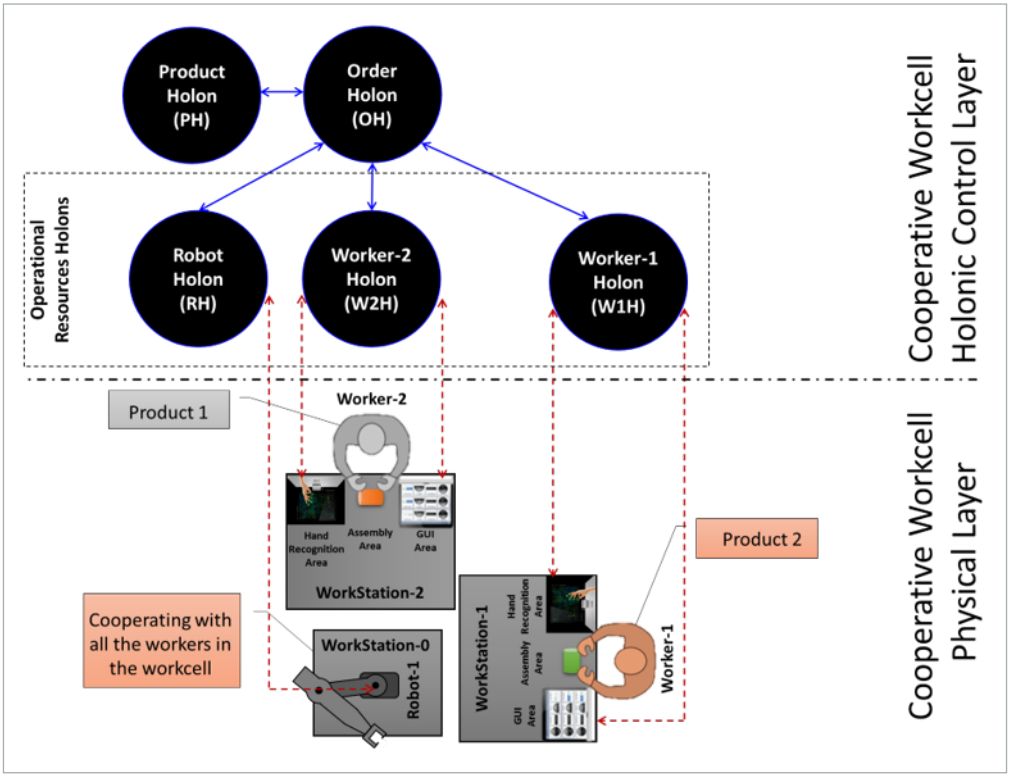
ABSTRACT

There is no doubt that the rapid development in robotics technology has dramatically changed the interaction model between the robot and the worker. The current robotics technology affords very reliable means to guarantee the physical safety of the worker during a close proximity interaction with the industrial robot. Therefore, new forms of cooperation between the worker and the industrial robot can now be achieved. Cooperative and collaborative robotics are the new fields in industrial robotics, which empowers the idea of close human-robot interaction in manufacturing. The two fields involve the use of a collaborative robot (cobot). The cobot is a social lightweight industrial robot that can cooperate safely with the human co-worker. This is in contrast with the conventional industrial robot that is dangerous to operate in a direct contact with the worker, therefore it often operates in isolation from the worker. The difference between the cooperative and collaborative manufacturing is that in cooperative manufacturing, both the worker and the cobot are sequentially performing separate tasks over the same product in the same shared workspace. However, in collaborative manufacturing, they simultaneously perform the shared task. Cooperative manufacturing is the main focus of study in this dissertation.

Cooperative manufacturing adds a new dimension to the production system, which promotes the agility and the flexibility of the production model. The fast success of cooperative manufacturing is a natural result of the varying production demands, which requires high level of customizability. Gathering the worker and the cobot in the same manufacturing workcell can provide this production customizability. This is because the worker does not only add the high flexibility of taking the proper actions based on the production demands, but also the worker is able to use his natural senses intuitively to form complex solutions during the real-time of production. Simultaneously, the cobot is a reliable resource in terms of speed, accuracy, and weight lifting. In other words, cooperative manufacturing supports the use of the cobot as a smart tool by the worker, to increase the efficiency and accelerate the productivity of the manufacturing.

Cooperative manufacturing is a new field of research, which addresses new challenges beyond the physical safety of the worker. Those new challenges appear due to the need to connect the worker and the cobot from the informatics point of view in one cooperative workcell. This requires developing an appropriate manufacturing control system, which fits the nature of both the worker and the cobot. Furthermore, the manufacturing control system must be able to understand the production variations, to guide the cooperation between worker and the cobot and adapt with the production variations.

Designing a manufacturing control solution that enables the cooperation between the worker and the cobot is the main purpose of this dissertation. The design of this manufacturing control solution has been done over three levels. The first level is the control software component. In this level, an autonomous three layers software component is developed to link the worker and the cobot to the control solution. The three layers of the software component are physical, communication, and reasoning. The second level of the solution is the cooperative workcell where other sources of information are represented along with the worker and the cobot such as the product and the manufacturing operations and tasks. Finally, the last level of the solution is the industrial enterprise where more than one cooperative workcell must coordinate together. Ultimately, three case studies have been introduced to test the viability and the feasibility of the proposed control solution.



FOLKER WIENTAPPER

Optimal Spatial Registration of SLAM for Augmented Reality

dem Fachbereich Informatik
der Technischen Universität Darmstadt
vorzulegende

DISSERTATION

zur Erlangung des akademischen Grades eines
Doktor-Ingenieurs (Dr.-Ing.)
von

Folker Wientapper

geboren in Caracas, Venezuela

Referenten der Arbeit:	Prof. Dr. Arjan Kuijper Technische Universität Darmstadt Prof. Dr. techn. Dieter W. Fellner Technische Universität Darmstadt Prof. Dr. Didier Stricker Technische Universität Kaiserslautern
Tag der Einreichung:	31.01.2019
Tag der mündlichen Prüfung:	15.03.2019

Darmstädter Dissertation
D 17

ABSTRACT

Augmented reality (AR) is a paradigm that aims at fusing the perceived real environment of a human with digital information located in 3D space. Typically, virtual 3D graphics are overlayed into the captured images of a moving camera or directly into the user's field-of-view by means of optical see-through displays (OST). For a correct perspective and view-dependent alignment of the visualization, it is required to solve various static and dynamic geometric registration problems in order to create the impression that the virtual and the real world are seamlessly interconnected.

The advances during the last decade in the field of simultaneous localization and mapping (SLAM) represent an important contribution to this general problem. It is now possible to reconstruct the real environment and to simultaneously capture the dynamic movements of a camera from the images without having to instrument the environment in advance. However, SLAM in general can only partly solve the entire registration problem, because the retrieved 3D scene geometry and the calculated motion path are spatially related only with regard to an arbitrarily selected coordinate system. Without a proper reconciliation of coordinate systems (*spatial registration*), the real world of the human observer still remains decoupled from the virtual world. Existing approaches for solving this problem either require the availability of a virtual 3D model that represents a real object with sufficient accuracy (model-based tracking), or they rely on use-case specific assumptions and additional sensor data (such as GPS signals or the Manhattan-world assumption). Therefore, these approaches are bound to these additional prerequisites, which limit the general applicability. The circumstance that automated registration is desirable but not always possible, creates the need for techniques that allow a user to specify connections between the real and the virtual world when setting up AR applications, so that it becomes possible to support and control the process of registration. These techniques must be complemented with numerical algorithms that optimally exploit the provided information to obtain precise registration results.

Within this context, the present thesis provides the following contributions.

- We propose a novel, closed-form (non-iterative) algorithm for calculating a Euclidean or a similarity transformation. The presented algorithm is a generalization of recent state-of-the-art solvers for computing the camera pose based on 2D measurement points in the image (*perspective-n-point problem*) - a fundamental problem in computer vision that has attracted research for many decades. The generalization consists in extending and unifying these algorithms, so that they can handle other types of input correspondences than originally designed for. With this algorithm, it becomes possible to perform a *rigid registration* of SLAM systems to a target coordinate system based on heterogeneous and partially indeterminate input data.
- We address the global refinement of structure and motion parameters by means of iterative sparse minimization (bundle adjustment or BA), which has become a standard technique inside SLAM systems. We propose a variant of BA in which information about the virtual domain is integrated as constraints by means of an optimization-on-manifold approach. This serves for compensating low-frequency deformations (*non-rigid registration*) of the estimated camera path and the reconstructed scene geometry caused by measurement error accumulation and the ill-conditionedness of the BA problem.
- We present two approaches in which a user can contribute with his knowledge for registering a SLAM system. In a first variant, the user can place markers in the real environment with predefined connections to the virtual coordinate system. Precise positioning of the markers is not required, rather they can be

placed arbitrarily on surfaces or along edges, which notably facilitates the preparative effort. During run-time, the dispersed information is collected and registration is accomplished automatically. In a second variant, the user is given the possibility to mark salient points in an image sequence during a preparative preprocessing step and to assign corresponding points in the virtual 3D space via a simple point-and-click metaphor. The result of this preparative phase is a precisely registered and ready-to-use reference model for camera tracking at run-time.

- Finally, we propose an approach for geometric calibration of optical see-trough displays. We present a parametric model, which allows to dynamically adapt the rendering of virtual 3D content to the current viewpoint of the human observer, including a pre-correction of image aberrations caused by the optics or irregularly curved combiners. In order to retrieve its parameters, we propose a camera-based approach, in which elements of the real and the virtual domain are simultaneously observed. The calibration procedure was developed for a head-up display in a vehicle. A prototypical extension to head-mounted displays is also presented.

COMPUTER GRAPHICS NIGHT 2018 RETROSPECT


Best Thesis Award
HERZLICH
APPLIED VISUA
COMPUTIN
HERZLIC
WILLKOMM
ZUM

BEST THESIS AWARD

*THE WINNERS OF THE **BEST THESIS AWARD** WILL BE ANNOUNCED AT THE COMPUTER GRAPHICS NIGHT EVENT.*

PANEL OF JUDGES
BEST THESIS AWARD

THE JUDGES

Prof. Dr. T. Schreck
TU Graz

Prof. Dr. A. Kuijper
Fraunhofer IGD

THE JUDGING PROCESS

The judges select the three bachelor's and master's theses they consider the best of those submitted for the Visual Computing Cluster between November 2018 and October 2019. These winning theses demonstrate high quality both with respect to scientific achievement and presentation.

The theses are chosen by the judges in collaboration with the theses supervisors. As the scope of visual computing is very broad, the winning theses are not ranked.

THE PRIZE

The winners receive a certificate, a book, and a trip to a Eurographics or equivalent leading visual computing conference, agreed by the winners with the judges.

BEST PAPER AWARD

THE FOLLOWING SECTION HIGHLIGHTS ALL NOMINATED PUBLICATIONS AND WORKS WORTHY OF DISTINCTION. THE WINNERS OF THE ***BEST PAPER AWARD*** *WILL BE ANNOUNCED AT THE COMPUTER GRAPHICS NIGHT EVENT.*

PANEL OF JUDGES

BEST PAPER AWARD

THE JUDGING PROCESS

The chair of the independent panel of judges receives forty selected papers for the Visual Computing Cluster in 2018 considered to be the best by the Fraunhofer IGD competence center heads and the professors of affiliated university groups. These papers span a wide range of research fields, including human computer interaction, computer graphics, computer vision, modeling, visual search and analysis and visual inference, medical computing and simulation.

The first task is to classify the papers into categories according to their impact on business, science, or society. Each paper is initially ranked by each judge based on three scores: 1) how relevant the paper is to the corresponding category, 2) the quality of the paper, and 3) how familiar the judge is with the topic (confidence value).

In the second step, scores for all papers are collected from all the judges, and the papers are each assigned to at least one category. Then the three best-ranked papers within an individual category are nominated. In addition, any papers that score at least one 'outstanding' grading by one of the judges are nominated.

Finally, the judges meet to discuss all nominated papers.
Two papers are selected as 'honorable mention' papers and one paper is selected as the 'best paper' for each of the categories.

THE JUDGES

Prof. R. Klein
Univ. Bonn (chair)

Prof. J. Gall
Univ. Bonn

Prof. M. Magnor
TU Braunschweig

Prof. H. Müller
TU Dortmund

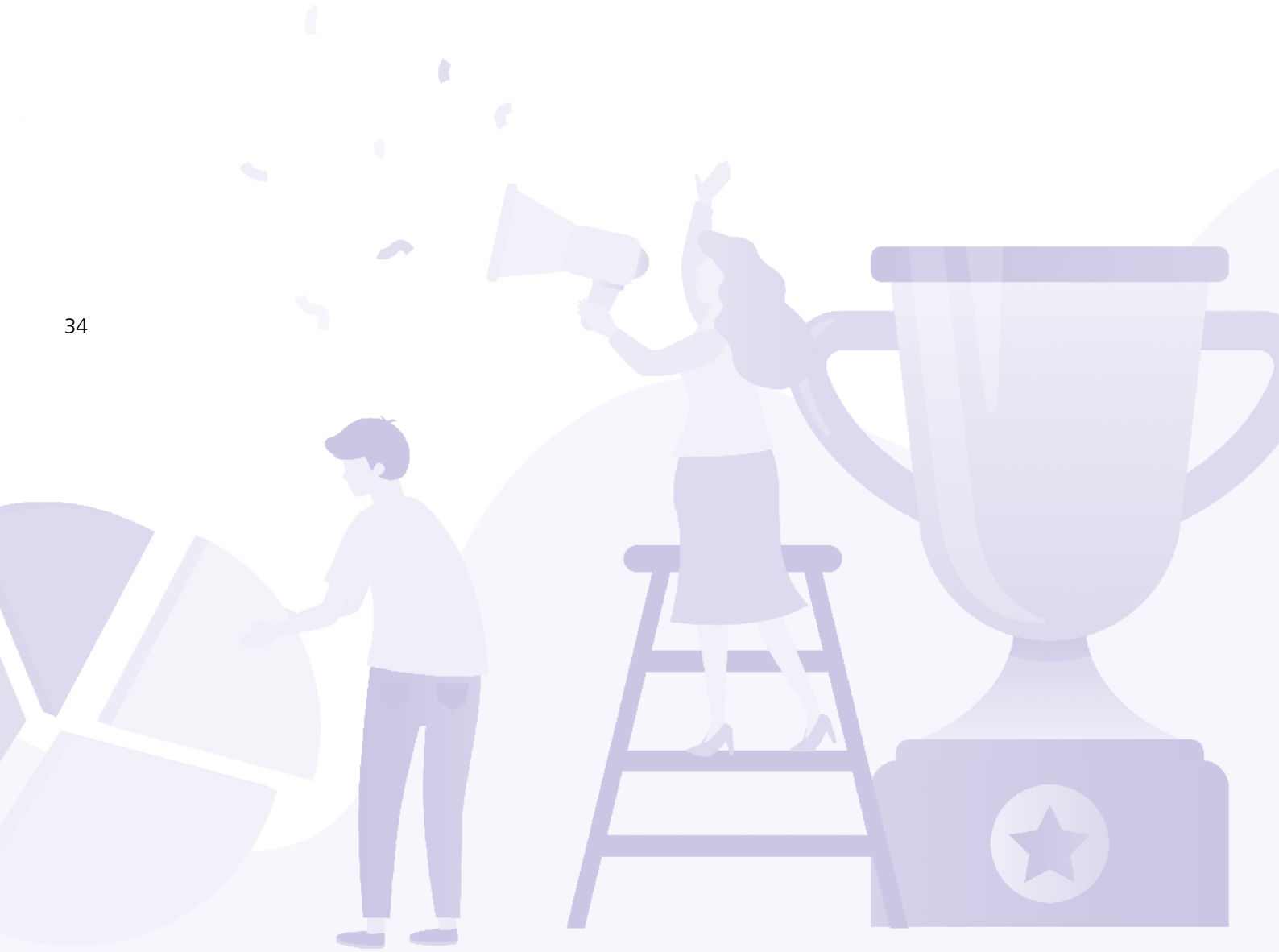
Prof. S. Gumhold
TU Dresden

THE PRIZE

The honorable mentions and the best paper authors receive a certificate. The authors of the best paper in the categories "Impact on business," "Impact on science," "Impact on society" also receive a book and a monetary prize.

FINAL NOMINATIONS

BEST PAPER AWARD



IMPACT ON BUSINESS

Bernard, Jürgen *(TU Darmstadt GRIS)*; Hutter, Marco *(TU Darmstadt GRIS)*; Zeppelzauer, Matthias *(Univ. of Applied Sciences St. Pölten)*; Fellner, Dieter W. *(Fraunhofer IGD)*; Sedlmair, Michael *(Univ. Wien)*: **Comparing Visual-Interactive Labeling with Active Learning: An Experimental Study.** In: IEEE Transactions on Visualization and Computer Graphics 24(1): 298–308 (2018).

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BEST INDUSTRIAL PROJECT AWARD

*THE WINNERS OF THE **BEST INDUSTRIAL PROJECT AWARD** WILL BE ANNOUNCED AT THE COMPUTER GRAPHICS NIGHT EVENT.*

PANEL OF JUDGES

BEST INDUSTRIAL PROJECT AWARD

THE JUDGES

Dr. M. Unbescheiden
Fraunhofer IGD

Dr. S. Wesarg
Fraunhofer IGD

P. Santos
Fraunhofer IGD

THE JUDGING PROCESS

The judges call for nominations for the Best Industrial Project Award. The submitted entries are evaluated in terms of economic criteria, such as project value/scope, the potential for follow-up projects, and technologies developed for other departments. Other aspects, including customer satisfaction, innovation, and utilization of publicly funded projects, are also taken into account.

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