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Advances in Visual Computing

15th International Symposium, ISVC 2020
San Diego, CA, USA, October 5–7, 2020
Proceedings, Part I

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Preface

It is with great pleasure that we welcome you to the proceedings of the 15th International Symposium on Visual Computing (ISVC 2020), which was held virtually during October 5–7, 2020. ISVC provides a common umbrella for the four main areas of visual computing including vision, graphics, visualization, and virtual reality. The goal is to provide a forum for researchers, scientists, engineers, and practitioners throughout the world to present their latest research findings, ideas, developments, and applications in the broader area of visual computing.

This year, the program consisted of 6 keynote presentations, 16 oral sessions, 2 poster sessions, 2 special tracks, and 1 tutorial. We received 175 submissions for the main symposium from which we accepted 65 papers for oral presentation and 41 papers for poster presentation. Special track papers were solicited separately through the Organizing and Program Committees of each track. A total of 12 papers were accepted for oral presentation from 18 submissions.

All papers were reviewed with an emphasis on the potential to contribute to the state of the art in the field. Selection criteria included accuracy and originality of ideas, clarity and significance of results, and presentation quality. The review process was quite rigorous, involving three independent blind reviews followed by several days of discussion. During the discussion period we tried to correct anomalies and errors that might have existed in the initial reviews. Despite our efforts, we recognize that some papers worthy of inclusion may not have been included in the program. We offer our sincere apologies to authors whose contributions might have been overlooked.

We wish to thank everybody who submitted their work to ISVC 2020 for review. It was because of their contributions that we succeeded in having a technical program of high scientific quality. In particular, we would like to thank the keynote speakers, the program chairs, the Steering Committee, the International Program Committee, the special track organizers, the tutorial organizers, the reviewers, the sponsors, and especially the authors who contributed their work to the symposium. In particular, we would like to express our appreciation to Springer for sponsoring the Best Paper Award this year.

Despite all the difficulties due to the pandemic, we sincerely hope that ISVC 2020 offered participants opportunities for professional growth.

October 2020

George Bebis
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Computational Bioimaging

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Tutorial

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Abstracts of Keynote Talks

Can Computers Create Art?

Aaron Hertzmann

Adobe Research, USA

Abstract. In this talk, I will discuss whether computers, using Artificial Intelligence (AI), could create art. I cover the history of automation in art, examining the hype and reality of AI tools for art together with predictions about how they will be used. I will also discuss different scenarios for how an algorithm could be considered the author of an artwork, which, I argue, comes down to questions of why we create and appreciate artwork.

Spatial Perception and Presence in Virtual Architectural Environments

Victoria Interrante

University of Minnesota, USA

Abstract. Immersive Virtual Reality (VR) technology has tremendous potential applications in architecture and design. In this talk I will review some of the work being done in my lab to enhance the utility of VR for architecture and design applications, focusing primarily on the investigation of factors influencing spatial perception accuracy in immersive architectural environments, but also including the use of VR technology to investigate questions of interest to architectural and interior designers such as how wallpaper patterns and window features affect people's subjective experience in architectural interiors.

The Shape of Art History in the Eyes of the Machine

Ahmed Elgammal

Rutgers University, USA

Abstract. In this talk, I will present results of research activities at the Art and Artificial Intelligence Laboratory at Rutgers University. We investigate perceptual and cognitive tasks related to human creativity in visual art. In particular, we study problems related to art styles, influence, and the quantification of creativity. We develop computational models that aim at providing answers to questions about what characterizes the sequence and evolution of changes in style over time. The talk will cover advances in automated prediction of style, how that relates to art history methodology, and what that tells us about how the machine sees art history. The talk will also delve into our recent research on quantifying creativity in art in regards to its novelty and influence, as well as computational models that simulate the art-producing system.

Object-Oriented Image Stitching

Ramin Zabih

Cornell University's New York City and Google, USA

Abstract. Image stitching is one of the most widely used applications of computer vision, appearing in well-known applications like Google Street View and panorama mode in commercial cell phones. However, despite the prevalence of artifacts and errors, there has been little to no progress in stitching research over the last ten years. There is no generally accepted evaluation metric and relatively few attempts to directly deal with large view point changes or object movement. We describe a reframing of stitching that exploits the importance of objects, and the algorithmic and evaluation techniques that naturally result. We will also present a technique that directly addresses the most visually disruptive stitching errors and can act as an alarm bell for these errors in stitching results. These ideas can be naturally extended to the panorama algorithms widely used in smartphones. Joint work with Charles Herrmann, Chen Wang, Richard Bowen, and Emil Keyder, from Cornell Tech and Google Research.

Fun with Visualization in the Data Deluge

Ross Maciejewski

Arizona State University, USA

Abstract. From smart phones to fitness trackers to sensor enabled buildings, data is currently being collected at an unprecedented rate. Now, more than ever, data exists that can be used to gain insight into questions that run the gamut from nonsensical to essential. One key technology for gaining insight into data is visualization. In this talk, we will explore how visualization can be leveraged to help us entertain fun and unique questions in the data deluge. We will investigate how social media can help us predict the next blockbuster film, how much information does your name carry, how Google Street View can open a world of questions for urban planners, and more. By thinking about fun questions for datasets, we will demonstrate how visual computing can help build cross-domain collaborations, paving the way to discover new insights and challenges.

Understanding Visual Appearance from Micron to Global Scale

Kavita Bala

Cornell University, USA

Abstract. Augmented reality/mixed reality (AR/MR) technologies are poised to create compelling and immersive user experiences by combining computer vision and computer graphics. Imagine users interacting with the world around them through their AR device. Visual search tells them what they are seeing, while computer graphics augments reality by overlaying real objects with virtual objects. AR/VR can have a far-ranging impact across many applications, such as retail, virtual prototyping, and entertainment.

In this talk, I will describe my group's research on these complementary areas: graphics models for realistic visual appearance, and visual search and fine-grained recognition for scene understanding. We will also see how these technologies can go beyond AR/VR applications to enable visual discovery – using recognition as a core building block, we can mine social media images at a global scale to discover visual patterns and trends across geography and time.

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