

Preface to the Special Issue on Cyberworlds 2014

This special issue includes the extended versions of high-quality papers selected from the Cyberworlds 2014 conference, held in Santander, Spain, during October 6–8, 2014 (for details, see: <http://www.cw2014.unican.es>). The International Conference on Cyberworlds, organized annually since 2002 in cooperation with the EUROGRAPHICS Association and the IFIP Workgroup 5.10 - Computer Graphics and Virtual Worlds, is the premier conference focused on cyberworlds and all related issues, including (but not limited to) computer graphics, shape modeling, user interfaces, virtual worlds, multimodal interaction and rendering, computer vision for augmented and mixed reality, multiplayer online games, social and affective computing, and cognitive informatics. The ten selected papers reflect the great diversity of topics covered by the Cyberworlds 2014 conference as well as the excellent level of its scientific contributions.

The first paper, “Image-Based Virtual Try-On System with Garment Reshaping and Color Correction,” by Yoshihiro Kanamori, Hiroki Yamada, Masaki Hirose, Jun Mitani, and Yukio Fukui, proposes an image-based virtual try-on system for garments in order to reproduce the appearance of try-on during online shopping. The primary goal is to avoid the unnatural images usually obtained from naive compositing in virtual fitting, where typically the garment is simply superimposed onto the customer image. The contribution consists of the entire design of a novel virtual fitting system including remarkable features such as garment image reshaping based on wearers’ body shapes, automatic color correction using facial colors, and automatic retouching of protrusions behind garments. A user test is also conducted to validate the system. It confirms that the virtual fitting results are natural looking and visually appealing.

The second paper, “Constructive Roofs from Solid Building Primitives,” by Johannes Edelsbrunner, Ulrich Krispel, Sven Havemann, Alexei Sourin, and Dieter W. Fellner, presents a new method for abstract building specification that allows one to specify complex buildings from simpler parts with an emphasis on assisting the blending of roofs. The importance of this topic comes from the observation that procedural modeling requires less effort than the manual 3D modeling typically required as post-processing in mesh-based automatic reconstruction of buildings. In procedural modeling, a coarse outline of the building is represented via a number of parts, while rules further refine the resulting geometry. However, nesting or Boolean union of parts are not fully suitable for structures such as roofs. This method aims at solving this problem. A prototype implementation of the system was evaluated by modeling three scenes with interesting roof structures from aerial images: the royal palace of Milan, part of the city of Graz, and the royal palace of Magdalena in Santander (Cyberworlds 2014 conference venue). Our readers are kindly invited to take a look at the pictures in the paper to appreciate the good performance of this approach.

The third paper, “Isometric Shape Correspondence Based on the Geodesic Structure,” by Taorui Jia, Kang Wang, Zhongke Wu, Junli Zhao, Pengfei Xu, Cuiting Liu,

and Mingquan Zhou, proposes a novel and computationally efficient approach to find the correspondence between two (nearly) isometric shapes represented as manifold triangle meshes. The method is based on the geodesic structure of the shape and minimum cost flow. The motivation is that, even for the same rigid object, it is difficult to get two perfectly isometric shapes (because of the triangulation process and geometry discretization errors). Thus, the goal is to find a shape-correspondence method minimizing the isometric deviation in a k dimensional Euclidean space that is built through geodesics from the same-base vertices, where the two (nearly) isometric shapes are nearly at the same position and have approximately a similar surface. Some correspondence examples are also discussed. They show that this method yields correct matches for a number of shapes.

The fourth paper “Individual Theta/Beta-Based Algorithm for Neurofeedback Games to Improve Cognitive Abilities,” by Yisi Liu, Xiyuan Hou, Olga Sourina, and Olga Bazanova, proposes and implements a neurofeedback system integrating an individual theta/beta-based neurofeedback algorithm in a shooting game. The system computes the individual alpha peak frequency, individual alpha band width, and individual theta/beta ratio, which make the neurofeedback training more effective. An experiment with five subjects was carried out to assess the effectiveness of the neurofeedback training system. The results show that all subjects overall have higher individual alpha peak frequency values right after the training or the next day, a clear indication of an enhancement of the subjects’ cognitive abilities related to features such as attention and memory.

The fifth paper, “Scale-Invariant Heat Kernel Mapping for Shape Analysis,” by Kang Wang, Zhongke Wu, Sajid Ali, Junli Zhao, Taorui Jia, Wuyang Shui, and Mingquan Zhou, presents a new shape analysis method with the scale-invariant property aimed at removing the effects of scale ambiguity. The method, called scale-invariant heat kernel mapping, is based on the heat diffusion process on shapes. This mapping procedure is an automatic scale adaptation method that allows the user to perform shape analysis without being confused by the scaling factors. Some experiments performed on the TOSCA dataset and reported in the paper demonstrate that the method achieves good robustness and effectiveness and it is suitable for situations of scaling transformation only, isometric deformation and scaling, and local scaling on shapes.

The sixth paper, “A Community-Built Virtual Heritage Collection,” by Helen C. Miles, Andrew T. Wilson, Frédéric Labrosse, Bernard Tiddeman, and Jonathan C. Roberts, describes a Web platform developed for the HeritageTogether project through which members of the public can upload their own photographs of heritage assets to be processed into 3D models using an automated structure-to-motion work flow. These 3D models are displayed online using a lightbox-style gallery and a virtual museum, while the large amounts of additional data produced are stored in an online archive. The Web platform is part of a larger project that aims to capture, create, and archive digital heritage assets in conjunction with local communities in Wales, UK, with a focus on megalithic monuments. The ultimate goal is to inspire local communities to learn more about their heritage and to help to preserve it using computer tools such as a digital community and community-built

archive and museum of heritage data. Our readers are kindly invited to visit the Web platform and (why not?) even become enthusiastic contributors of this exciting and valuable project.

The seventh paper “Identifying Users from Online Interactions in Twitter,” by Madeena Sultana, Padma Polash Paul, and Marina Gavrilova, focuses on the potential of the analysis of online interactions for user identification. This is a very hot topic of research closely related to the exponential growth of online social networks. The main goal of this paper is to determine how online interactions of individuals can be effectively used as biometric information. To this aim, the paper analyzes how such online interactions retain the behavioral patterns of users and their consistency over time. As a result, it proposes a novel method to identify users from online interactions in Twitter. Experiments conducted on a database of 50 Twitter users over five different periods of time show very promising results that demonstrate the potential of online interactions for the authentication process of social network users.

The eighth paper, “Applying Geometric Function on Sensors 3D Gait Data for Human Identification,” by Sajid Ali, Zhongke Wu, Xulong Li, Nighat Saeed, Dong Wang, and Mingquan Zhou, proposes a novel approach for human identification based on sensor data acquired by means of an optical system. The basic idea is to process 3D motion data of gait joints through the straight-walking view. Three joints of the human body (hip, knee, and ankle) are selected to compute the gait movement in this algorithm. The method extracts suitable 3D static and dynamic joint features from data and applies parametric Bézier curves on these features to derive the strong correlation between joint movements. The control points of the curve are used to build the triangles of each walking pose, which are then used to compute the area with transfer features from the 3D to 1D space of each pose. Then, statistical techniques are used to obtain a unique direct relationship between gait joints, called gait signature, which can be further used to perform human identification from a database containing recorded motion subjects, each walking at different speed, and performing several direction changes. Experimental results show that the method exhibits outstanding human identification capabilities.

The ninth paper, “The Influences of Online Gaming on Leadership Development,” by Tinnawat Nuangjumnong, seeks to identify the effects of gameplay on leadership behaviors and determine how video games can be used as a didactic tool for leadership development. Through contingency leadership theory, and using a large set of self-report questionnaires, this study finds that the continuous practice of specific game roles (such as carry, support, or ganker) in MOBAs (multiplayer online battle arena games) promotes the development of real-world leadership styles. Effects of gameplay on leadership behaviors are estimated using propensity score matching and doubly robust estimation. The empirical analysis reveals that game players who predominantly play a specific role in games exhibit stronger real-world behaviors of the corresponding leadership style.

The tenth and last paper, “An Efficient Pose-Tolerant Face Recognition Approach,” by Refik Samet, Ghulam Sakhi Shokouh, and Kemal Batuhan Baskurt, addresses the problem of pose in face recognition for biometric identification. Pose is one of the most critical problems in face recognition, because the face appearance changes drastically with changes in facial pose due to misalignment and hiding of many facial features.

This paper proposes a novel pose-tolerant face-recognition approach that includes feature extraction, pose transformation learning, and recognition stages. In the first stage, 2D PCA (principal component analysis) is used as a robust feature extraction technique. Then, linear regression is used as an efficient and accurate transformation learning technique to create a frontal face image from different posed face images in the second stage. In the last stage, Mahalanobis distance is used for recognition. Experiments on FERET and FEI face databases demonstrate that this method outperforms other traditional approaches for these benchmarks.

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