Fact Sheet – Technical Briefs

Chair : Zhengyou Zhang, Microsoft Research, USA
Co-Chair : Zhengguo Li, Institute for Infocomm Research, A*STAR, Singapore
Conference : Wednesday 28 November – Saturday 1 December 2012
Exhibition : Thursday 29 November – Saturday 1 December 2012

The SIGGRAPH Asia 2012 Technical Briefs program is a new initiative for SIGGRAPH Asia and will be a premier international forum for new research results in graphics, especially at the intersections of graphics with audio, image, video, and human-computer interaction.

Leading international experts from over the world will present their results in peer-reviewed research spanning a wide range of research areas including, but not limited to sensor-based human-computer interaction, graphics and human-computer interface, high-dynamic range imaging, high-definition imaging, 3D imaging, image processing for graphics, high-dynamic range and high-definition video, 3D video, 3D audio, mixed reality, augmented reality, virtual reality, and graphics and multimedia.

Fast Facts

The Technical Briefs program received a total of 99 submissions. Of these, a total of 28 papers were accepted. This is an acceptance rate of 28.3%, slightly higher than the Technical Papers program, but is still very selective. These papers were chosen by the Technical Briefs Committee based on the importance of the problem being solved, the impact and potential of each paper, and its technical strength and rigor.

Two special sessions have been planned with leading international experts:
- Computer Vision Meets Computer Graphics;
- Facial Animation and Tracking.

The papers accepted range from traditional computer graphics to intersections with audio, image, video, and HCI to applications to haptics and device energy management.

Quote from the Technical Briefs Chair, Zhengyou Zhang, Microsoft Research, USA

"The attendees will see a diverse range of research topics presented in the Technical Briefs program. The presentations range from traditional computer graphics to intersections with audio, image, video, and HCI to applications to haptics and device energy management. They will take away new ideas for their existing research as well as new ideas for their next steps."

- ***Real-time Animation and Rendering of Ocean Whitecaps***
  Jonathan Dupuy and Eric Bruneton, INRIA

This paper describes a scalable method to procedurally animate and render vast ocean scenes with whitecaps on the GPU. The whitecap coverage on the ocean surface is determined using a wave deformation criterion that can be pre-filtered linearly. Based on this, the proposed method takes

advantage of the fast mip-mapping and texture filtering capabilities of modern hardware and produce plausible and anti-aliased images for scales ranging from centimeter to planetary in real time.

- ***Scoring Functions for Automatic Arrangement of Business Interiors***
  Szymon Chojnacki, Reterio Project, Poland

This paper presents a system that automatically creates diversified and high quality arrangements of business interiors. The new idea is to look at the problem from the recommender system's perspective. A custom procedural mechanism is used. However, instead of defining an optimization function, a scoring function is used. The system consists of three modules. The procedural generation module generates large amount of acceptable layouts quickly. The scoring module ranks the proposed scenes. Then a diversity module selects the best and distinct arrangements, which are delivered to a user.

- ***Latent Irregular Splines for Animation Approximation***
  Tomohiko Mukai, Square Enix Co., Ltd.

This paper presents a new method to approximate animation sequences through a nonlinear analysis of the spatiotemporal data. The main idea is to find a spline curve which best approximates a multivariate animation sequence in a reduced subspace. The described method first eliminates data redundancy among multiple animation channels using principal component analysis (PCA). The reduced sequence of latent variables is then approximated by a non-uniform spline with free knots. To solve the highly-nonlinear multi-modal problem of the knot optimization, a stochastic algorithm called Covariance Matrix Adaptation Evolution Strategy (CMA-ES) is introduced, which guarantees the best approximation for arbitrary animation sequences such as mesh animations and motion capture data.

- ***3D Diff: An Interactive Approach to Mesh Differencing and Conflict Resolution***
  Jozef Dobos and Anthony Steed, University College London

This paper presents an open source tool, 3D Diff, which supports differencing and merging of 3D models. As modeling software grows in use and as 3D models become more complex and require input from more users, there is an emerging problem of maintaining large scenes over time. A scene may be concurrently edited by different users, so there is a need to merge different versions of a 3D model. The 3D Diff tool automatically detects differences in 3D models by noting correspondences and discrepancies between them; and it then provides an interactive tool to select between such changes in order to affect a merge. To achieve this, the notions are introduced of explicit and implicit conflicts in 3D models and a prototype implementation has been developed to support the differencing and merging processes.

- ***Video Enhanced Gigapixel Panoramas***
  Oliver Deussen and Soeren Pirk, University of Konstanz
  Michael Cohen, Johannes Kopf, and Matt Uyttendaele, Microsoft Research Redmond

This paper presents a method for embedding video clips within gigapixel scale imagery. The combination of high-resolution imagery and video enables users to pan and zoom across the gigapixel panorama to explore complex scenes with motion. A sparcity of the video content within the gigapixel context introduces several challenges that are overcome through optimizing the

traversal of the scene coupled with appropriate playback of the embedded video. Embedding video in large scale panoramas fills a gap between static gigapixel images and video footage and thus presents a new interactive medium.

- ***Adaptive Maximal Poisson-Disk Sampling on Surfaces***
  Peter Wonka and Dong-Ming Yan, GMSV, KAUST

This paper describes a method for generating maximal Poisson-disk sets with varying radii on surfaces. Based on the concept of power diagram and regular triangulation, a geometric analysis of gaps in such disk sets on surfaces is presented, which is the key ingredient of the adaptive maximal Poisson-disk sampling framework. Moreover, the presented sampling framework is adapted for re-meshing applications. Several novel and efficient operators are developed for improving the sampling/meshing quality over the state-of-the-art.

- ***Dynamic 3-D Facial Compression Using Low Rank and Sparse Decomposition***
  Lap-Pui Chau, Junhui Hou, Ying He, Nadia Magnenat-Thalmann, and
  Dao T. P. Quynh, Nanyang Technological University

This paper presents a new compression framework for dynamic 3D facial expressions acquired from structured light based 3D camera. Taking advantage of the near-isometric property of human facial expressions, the dynamic 3D faces are parameterized into an expression-invariant canonical domain, which naturally generates geometry video and allows the user to apply the well-studied video compression technique. Then, low rank and sparse decomposition is applied to each dimension (i.e., X, Y and Z, respectively) before the H.264/AVC encoder is employed to separately encode each dimension instead of encoding them as a whole. Experimental results show that the averaged 3-4 dB gain is achieved by the proposed scheme compared with existing algorithms.

- ***A 2.5D Culling for Forward+***
  Takahiro Harada, AMD

This paper presents a 2.5D culling for Forward+, which is simple and inexpensive, but effective. The proposed method culls lights that fall in the void space between the foreground and background geometry. The proposed culling can be implemented by adding a few ALU instructions to the Forward+ rendering pipeline without adding additional data structure or memory consumption. Several tests are performed to evaluate the culling accuracy and computation overhead of the 2.5D culling.

- ***Computing Defect-Insensitive Geodesic Distance on Broken Meshes***
  Ying He, Dao T.P. Quynh, and Xiang Ying, Nanyang Technological University
  Shi-Qing Xin, Ningbo University

Computing geodesic distance on surfaces plays a critical role in digital geometry processing. However, due to its local nature, the geodesic distance is highly sensitive to local geometrical and topological changes, thus, diminishing its applications to real-world models which may contain various kinds of defects. This paper presents a novel algorithm to compute defect-insensitive geodesic (DIG) distance on broken meshes. In sharp contrast to the existing geodesic algorithms which compute the distance from the source to all destinations in a single Dijkstra-like sweep, one method computes DIG distance in an iterative and global manner. Thanks to its global nature, the resulting distance is insensitive to the holes, gaps, shortcuts, boundaries, mesh

triangulation/resolution, and robust to noise. The proposed method is free of parameter and does not require any mesh repairing or preprocessing, and is demonstrated with practical applications of face segmentation and shape descriptor.