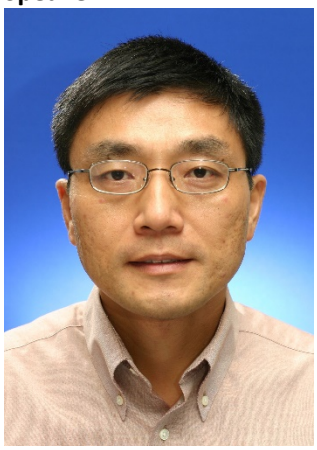
Tutorial 2: Evaluating and Processing Partially-Artificial Images

Since the invention of the camera in early 19th century, natural images have been captured striving to obtain real, objective reflection of the visible world, as the dominant mass of visual signals. With recent rapid advancement of visual computing and networking, however, there have been increasing applications and services making use of partially-artificial images (PAIs)*. First of all, screen content images (SCIs) are a combination of naturally captured images, text and graphics generated by computers, in widespread situations of screen capturing/analysis/matching, virtualized screen sharing for multi-client communication, augmented reality (AR), cloud computing, remote education, and on-line/native advertising. Another category of PAIs are retargeted images (RTIs), which result from adapting natural images into different image sizes， aspect-ratios and visual content selections, with applications of in-service image adaption for diverse display devices and network conditions, automatic (or semi-automatic) image editing to change the composition of visual objects, advertisement generation, webpage content creation, mobile web browsing, post-processing of TV/movies, etc. More and more PAIs are expected to be constructed for advanced computational photography, 3D point cloud based rendering, and other AI (artificial intelligence)-oriented scenarios.
PAIs contain naturally-captured visual components, and artificially-generated ones (as SCIs) or artificially-altered ones (as RTIs); these two types of visual components have different visual characteristics, and therefore, toward effective processing and management, they have to be correctly identified, sufficiently segmented, differentially evaluated, and adaptively processed. There is a call for more systematic and careful investigation for this new form of visual signals and its implication.

In this tutorial, the demand and potential of PAIs are to be firstly analysed, with their characteristics discussed. Then, the basic relevant computational modules in literature are introduced, for both camera-captured and computer-generated/altered images. Afterward, we concentrate on SCIs and RTIs since they have been relatively better developed so far. For SCIs, we will talk in details for segmentation of textual and pictorial regions, learning-based compression, just-noticeable difference (JND) estimation, and signal quality evaluation. For RTIs, the two important issues are geometry changes and information loss. We will identify the importance of correspondence estimation between an original image and its retargeted version, and predict the retargeting quality with dense and sparse correspondences, respectively. The last part of the tutorial is devoted to discussion and further exploration toward possible related future R&D effort, especially in the AI context, based upon the presenter's extensive project experience for both academic research and industrial deployment.

**History moves in a spiral somehow. Over a very long period of time in history, people merely depended upon painters' artificial, subjective record for the world. The great success and wide-availability of cameras have enabled unprecedented possibilities of accurate, objective depiction of real-world visual reality (this had forced many painters turn to develop abstract art, because they were not able to compete with photographers to provide realistic depiction of the world). Now, artificial (computed) visual components start to play an increasing role together with naturally captured images. Technology has been on spiral rise indeed.*

Speaker:



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