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Representation of 3D environments based on images

Virtual reality systems are generally based on computer graphics models of scenes and objects. With a complete model, it is possible to navigate in a virtual environment by generating the images as needed on a virtual camera. This is widely used in video games. However, if we want to remotely navigate in a real, existing physical environment, it is very costly and time-consuming, if not impossible, to generate an accurate graphics model of the entire environment. It is more realistic to accomplish this based on actual images taken of the environment. This field, called *image-based rendering*, is quite new and there remain many unsolved questions: Which images should be captured—how many and from what viewpoints? How should this potentially enormous dataset be represented and stored? How can arbitrary views be rendered quickly for real-time navigation, with high quality? How can the system be designed for remote navigation, say over the internet? These issues will be surveyed in this talk.