

# Algorithm finds best places to put cameras for 3-D reconstructions

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An online algorithm devised by Disney Research enables filmmakers to determine the optimal number and location of cameras for capturing a given scene, enabling them to amass the data that they increasingly want and need during post-production.

With sufficient information about the billions of [light rays](#) emanating from a scene, for instance, filmmakers can use [computational techniques](#) to relight the set virtually, to generate new viewpoints and to digitally recover the detailed 3-D shapes and layout of a scene, or even of an actor's face.

But knowing where to place cameras can be tricky, said Changil Kim, a Ph.D. student in computer graphics at Disney Research and ETH Zurich. If cameras are few and far between, the chances that a location will be blocked by an object in the foreground are increased. And if cameras are too close together, the differences in successive views can become too tiny to provide any value or useful information.

"To solve this, we focused on the problem of automatic online view-sampling, where each new view results in the best possible additional shape reconstruction incrementally," Kim said. At each iteration, the algorithm he and his colleagues developed adds a camera view and calculates a depth map of a scene; this process continues until the last [camera](#) view added results in a negligible improvement.

If there is a limit on the number of cameras available, the algorithm can

stop at that number, providing an optimal spacing and placement of that number of cameras.

The Disney researchers presented their findings at the International Conference on Image Processing (ICIP 2015) in Quebec City. Conference organizers have recognized their report as among the top 10 percent of papers being presented this year.

The researchers compared their new method with regular sampling on both synthetic and real scenes and showed they could recover high quality detail with fewer than half the number of cameras required for regular sampling.

"Our online sampling analysis considers the statistics of the very [scene](#) being captured and thus results in a significant win over dense, arbitrarily or regularly placed cameras," said Kenny Mitchell, a senior research scientist at Disney Research.

Provided by Disney Research

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