

## Popular science summary of the PhD thesis

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Title of the PhD thesis Estimating and Simulating Structure and Motion

PhD school/Department DTU Compute

### Science summary

\* Please give a short popular summary in Danish or English (approximately half a page) suited for the publication of the title, main content, results and innovations of the PhD thesis also including prospective utilizations hereof. The summary should be written for the general public interested in science and technology:

In computer vision, the task is typically to extract information and estimate parameters from images. In contrast, in computer graphics, the goal is to render images given information and parameters about the appearance. Two important topics in these fields are structure and motion. In computer vision, we often want to estimate these, and they are necessary to know when we render images.

In this work, we focus on the interaction between the four terms structure, motion, estimation. We focus on using estimations to create realistic simulations and how we can use simulations to produce better estimations. Specifically, we do this through three different applications.

First, we present a method for creating slow-motion videos from regular videos. We create in-between frames in the videos by estimating the naturally occurring motion and interpolating this to new timestamps. The motion is estimated using a neural network architecture.

Second, we estimate physical objects' geometry and use this to simulate the appearance of physical motion. The estimated geometry is used to create specific patterns that, when projected onto the object with a light projector, creates the appearance that the object is moving.

Third, we provide a method for reconstructing object geometry from images by simulating the imaging process used to acquire the images. By simulating the imaging process, we can compare the captured images and rendered images directly and adjust the object geometry iteratively until the rendered images are as similar as possible to the real images.

Please email the summary to the PhD secretary at the department