Structural model-based learning technique for multisampled interpolated image formation with enhanced resolution

Multisampled imaging using assorted pixels is a demosaicing method for collecting information about various image dimensions (e.g. space, brightness, time, polarization, color, and depth). These dimensions are highly correlated to each other, such that the information of one dimension can be successfully predicted from the information of another dimension. A structural model algorithm based on a collection of archetypical images constructs parameters that relate different dimensions. A typical multisampled image does not contain high quality information about every dimension. The information from the image at hand is processed using this model, which determines the parameters for all image dimensions, including those that were initially low in resolution. The reconstructed high-quality image then contains more data about each dimension.

Multisampled imaging provides the means for sampling more image dimensions without causing a reduction in resolution.

Traditional multisampled imaging assigns specific pixels to dimensional information. However, the interpolation techniques used cause loss of resolution in the other dimensions, resulting in lower quality images. The reconstruction of multisampled images from the model-based technique is superior to that of conventional interpolations because the algorithm used is based on a large library of example images, while also taking advantage of the redundancies of light in the scenes being imaged. Thus, all dimensions of the image are enhanced without sacrificing loss of resolution in any other dimension, or without necessitating a large increase in pixel density. Also, because the interpolation technique is based on polynomial functions, it can be easily incorporated into existing imaging software.

Applying the structural model based learning method to traditional multisampled imaging techniques has validated the increased image resolution provided by the technology.

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Applications:

- Algorithm for image resolution in editing software.
- Higher quality images for all forms of electromagnetic radiation based techniques, including infrared, X-ray, MRI, microscopy, cameras, and video cameras.

Advantages:

- The structural algorithm used is easily trained from sample images.
- Provides multisampled images without loss of resolution in any dimension.
- Due to the simplicity of the interpolation technique, the structural model can be easily implemented into existing technologies.
- This technique is modular for all forms of electromagnetic radiation based imaging techniques.

Patent information:

Patent Issued US 7,149,262 B1

Tech Ventures Reference: IR M01-017

Related Publications:


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