

Fast Implementation Of Equally-Sloped Tomography

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SUMMARY

Dr. Miao and colleagues at UCLA have developed a novel algorithm that quickly processes high quality image reconstruction of data acquired through Equally-Sloped Tomography.

BACKGROUND

Tomography is an imaging technique that uses cross-sectional images to depict an object. The utility of this technique ranges across medical imaging of the body to geophysical imaging of the Earth's surface. There is continuous work to advance tomographic analysis to improve image quality. One such method that was developed is Equally-Sloped Tomography (EST), which is capable of reconstructing images from under-sampled and noisy data sets. EST has been shown to produce higher quality images than other conventional tomographic techniques, but it is limited by the high computation requirements, which slow down its processing speed. Further improvements on EST are necessary to make it usable for time-sensitive applications.

INNOVATION

UCLA researchers have developed a novel algorithm that improves upon the established EST techniques by significantly reducing the computational time required to reconstruct images. This algorithm not only overcomes the high computation requirements of EST, but also results in higher quality images. The quality of these images is comparable to images reconstructed by other conventional methods, such as filtered back projection (FBP), but requires 80-90% less radiation. As EST has been adapted to be used for a variety of tomographic modalities, this algorithm can be applied to a variety of fields.

APPLICATIONS

- ▶ Incorporation of EST to various tomography techniques (CT, CAT, PET, 3D Ultrasound, etc.)
- ▶ Time-sensitive tomographic modalities

ADVANTAGES

- ▶ Can be applied to any imaging technique that utilizes tomography
- ▶ Better image quality compared to previous algorithms
- ▶ Significantly reduces required radiation dose to achieve high quality images
- ▶ Faster computational time
- ▶ Doesn't require any direct interpolations

STATE OF DEVELOPMENT

- ▶ Algorithm developed with future plans to implement it with existing medical CT scanners at UCLA

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	8,611,626	12/17/2013	2009-529

RELATED MATERIALS

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INVENTORS

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OTHER INFORMATION

KEYWORDS

tomography, computed tomography (CT), equally-sloped tomography (EST), image reconstruction, image processing, algorithm, reconstruction algorithm

CATEGORIZED AS

- ▶ Computer
 - ▶ Software
- ▶ Imaging
 - ▶ Medical
 - ▶ Software

RELATED CASES

2009-529-0

▶ Miao, J., Förster, F., and Levi, O. Equally sloped tomography with oversampling reconstruction. Phys. Rev. B. 72. 052103. August 4, 2005.

▶ Lee, E., Fahimian, B.P., Iancu, C.V., Suloway, C., Murphy, G.E., Wright, E.R., Castaño-Díez, D., Jensen, G.J., and Miao, J. Radiation dose reduction and image enhancement in biological imaging through equally-sloped tomography. J Struct Biol. 154. 2. 221-227. Nov 2008.

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

▶ [Incorporation of Mathematical Constraints in Methods for Dose Reduction and Image Enhancement in Tomography](#)

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