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Operation of Computed Tomography

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Editorial

The X-ray generator spins around the object in X-ray computed tomography, and the X-ray detectors are on the other side of the circle from the X-ray source. A CT scout (scanogram or topogram) is a diagram that is used to design each scan slice.A sinogram is a visual representation of the raw data obtained, however it is insufficient for interpretation. After the scan data has been taken, it must be processed using a tomographic reconstruction method, which results in a sequence of cross-sectional pictures. An X-ray tube and detector are physically rotated behind a circular shroud in traditional CT devices (see the image above right). Electron Beam Tomography (EBT) was a short-lived alternative that used electromagnetic deflection of an electron beam within a very large conical X-ray tube and a stationary array of detectors to achieve extremely high temporal resolution for imaging rapidly moving structures like the coronary arteries. Due to the geometry of the X-ray beam, systems with a large number of detector rows, such that the z-axis coverage is comparable to the xy-axis coverage, are often referred to as cone beam CT (strictly, the beam is pyramidal in shape, rather than conical). Radiocontrasts are contrast media that are utilised in X-ray CT and plain film X-ray. Iodine-based radiocontrasts are commonly used in X-ray CT. This is useful for drawing attention to things like blood vessels that would otherwise be difficult to distinguish from their surroundings. Using contrast material to acquire functional information about tissues can also be beneficial. Images are frequently obtained with and without radiocontrast.

Getting's' for transmission images

The collimated X-ray source creates transmission beams that are effectively "parallel rays" in a geometrical optical sense during the above-mentioned motion (that is, pivoting around the target) of the parallel beam irradiation optical system. Each ray of the transmission beam travels in the same direction as the t-axis. The X-ray source's transmission beam enters the object and, after attenuation due to absorption by the item, reaches the screen.

One of the most well-known algorithmic strategies for solving this problem is filtered back projection. It is predictable, adjustable, and theoretically simple. It is also computationally light, requiring only a few milliseconds per image with contemporary scanners. However, this isn't the only option: the original EMI scanner used linear algebra to tackle the tomographic reconstruction problem, but this method was hampered by its high computational complexity, especially considering the computer technology available at the time. Manufacturers have recently developed maximum likelihood expectation maximisation strategies based on iterative physical models.

These methods are useful because they rely on an internal model of the scanner's physical attributes and X-ray interaction physical principles. Earlier methods, such as filtered back projection, presuppose a flawless scanner and overly simplified physics, resulting in a variety of artefacts, high noise, and poor image quality. Iterative approaches result in images with better resolution, less noise, and fewer artefacts, as well as the possibility to minimise the radiation dose in some cases [1-5].

The problem is that it has a very high computational need, although developments in computer technology and high-performance computing approaches, such as using massively parallel GPU algorithms or specialised hardware like FPGAs or ASICs, have made this possible. The basic principle of tomography will be discussed in this section, with a focus on tomography using the parallel beam irradiation optical system. Tomography is a method of obtaining virtual'slices' (a tomographic image) of a certain cross section of a scanned object using a tomographic optical system, allowing the user to look within the object without cutting it.

References

1. Rosenthal, Daniel I., Jeffrey B. Weilburg, Thomas Schultz and Janet C. Miller, et al. “Radiology order entry with decision support: initial clinical experience.” *J Am Coll Radiol* 3 (2006):799–806.
2. Caoili EM. “Imaging of the urinary tract using multidetector computed tomography urography.” *Semin Urol Oncol* 20 (2002):174–179.
3. Nawfel, Richard D., Philip F. Judy, A. Robert Schleipman, and Stuart G. Silverman. “Patient radiation dose at CT urography and conventional urography.” *Radiology* 232(2004):126–132.
4. Chow LC, Kwan SW, Olcott EW, Sommer G. “Split-bolus MDCT urography with synchronous nephrographic and excretory phase enhancement.” *AJR Am J Roentgenol* 189 (2007):314–322.
5. Hadley JL, Agola J, Wong P. “Potential impact of the American College of Radiology appropriateness criteria on CT for trauma.” *AJR Am J Roentgenol* 186 (2006): 937–942.

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