Unsupervised Positron Emission Tomography (PET) Image Denoising using Double Over-Parameterization

Tech ID: 33808 / UC Case 2022-576-0

ABSTRACT

Researchers at the University of California, Davis, have developed a novel imaging system that improves the diagnostic accuracy of PET imaging. The system combines machine learning and computed tomography (CT) imaging to reduce noise and enhance resolution. This novel technique can integrate with commercial PET imaging systems, improving diagnostic accuracy and facilitating superior treatment of various diseases.

FULL DESCRIPTION

PET is a minimally invasive imaging modality with a wide range of clinical and research applications, such as cancer, infectious diseases, inflammation, and neurological conditions. PET offers three-dimensional mapping upon administering positron-emitting radiopharmaceuticals such as (18)F-fluorodeoxyglucose to measure metabolism. However, while used globally, PET's main limitation is the noisy images, which complicates geometric interpretation and subsequent diagnosis.

Researchers at the University of California, Davis, have developed a novel set of algorithms that use Deep Image Prior (DIP) to decrease and/or eliminate noise in PET scanning. The method combines PET, DIP, and CT imaging from the same patient to improve imaging and diagnostic accuracy. Results shown within animal models indicate that the invention significantly reduces noise while retaining fine details of the image.

APPLICATIONS

- Diagnostic PET imaging for many tissues and diseases.

FEATURES/BENEFITS

- A novel set of algorithms that combines DIP and CT imaging to reduce the noise of PET imaging
- Preclinical data in an animal model show that a prototype of the method can reduce noise and retain imaging quality
- It may improve the diagnosis of many conditions, leading to optimal treatment and enhanced clinical outcomes for many diseases

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	12488446	02/02/2025	2022-576

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OTHER INFORMATION

KEYWORDS

diagnostic imaging, CT, PET, radiopharmaceuticals, oncology, neurology, inflammation

CATEGORIZED AS

- **Imaging**
  - Medical
  - Other
- **Medical**
  - Devices
  - Diagnostics
  - Disease: Autoimmune and Inflammation
  - Disease: Cancer
  - Disease: Central Nervous System
  - Disease: Infectious Diseases
  - Imaging
- **Nanotechnology**
  - Other
- **Research Tools**
  - Screening Assays

RELATED CASES

2022-576-0

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Real-Time Tissue Assessment During Surgical Procedures
- Auto Single Respiratory Gate by Deep Data Driven Gating for PET
- A Combined Time-Walk and Timing-Shift Correction Method for Dual-Ended Readout TOF-DOI PET Detector

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