Image Fusion

Nuclear Medicine Images with Magnetic Resonance Imaging

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Group 8

Introduction

- History
    - Combines two types of medical imaging
        - Magnetic Resonance Imaging (MRI) and Nuclear Medicine (NM).
        - MRI was invented in 1970's and NM in 1920's
- Purpose
    - Image with higher range of optimal characteristics
    - MRI is used for soft tissues while NM is used to provide metabolic information
    - MRI and NM provide a lit up "hotspot" when combined
    - Positron emission tomography (PET)

Importance

- Optimizes the best qualities of MRI and Nuclear Medicine through their combination
  - MRI: No radiation exposure, good soft tissue contrast
  - Nuclear Medicine: Early detection of abnormalities
- Images Bone Disorders such as: bone metastasizing cancer, osteomyelitis and avascular necrosis
- Display differences in bone metabolism
  - Leads to understanding of causes and potential treatments

Methods

- **Processing:**
  - Both images are registered to ensure they are aligned and in the same coordinate system
  - Characteristic features are marked, extracted, and aligned with the reference image
  - Features are checked to ensure they are aligned with the corresponding image

- **Fusion:**
  - The two images are combined by lining up features, then overlaying pixels
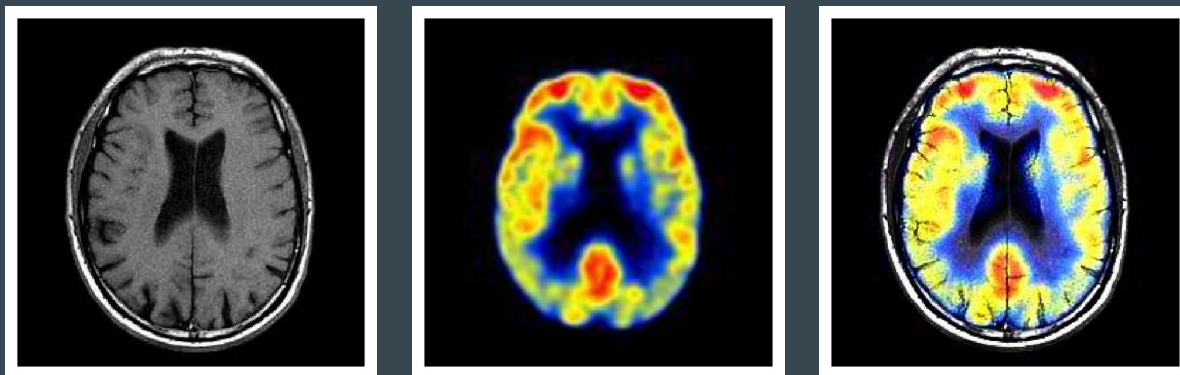

Figure 1: An image fusion between MRI and PET. The leftmost image is the MRI, the middle image is the PET scan. The rightmost image is the fusion of the two.

Source: https://www.hindawi.com/journals/tswj/2014/708075/

Future Work

- Current techniques: What are the strengths? What are the pitfalls?

- Strengths Amplify, Pitfalls Counteracted

- PET, CT, MR, NM

- PET, MR in Detection of Liver Metastasis in Patients with neuroendocrine tumors of the GI tract

Conclusion

- The best aspect of Image Fusion is that it allows us to combine different imaging technologies
- Image Fusion allows us to better see and diagnosis bone issues and diseases
- Image Fusion is not limited to just Nuclear Medicine and MRI, we can also combine CT and PET
- Clinicians and researchers are able to get higher quality images, which allows them more accurately diagnose the issue and get the best treatment
- Image Fusion has a promising future

Work Cited (MAKE INTO APA)

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