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Content Beyond Syllabus Report

Academic Year	2023 -2024
Subject	BMT 401 – Principles of Medical Image Processing
Faculty	Ms. Sharon Gomez
Content Beyond Syllabus	RECENT TRENDS IN BIOMEDICAL IMAGE PROCESSING

Advancement occurs day by day in the field of Medical Image Processing. Here are some among them.

1. Deep Learning in Medical Imaging:
   - Deep learning, especially Convolutional Neural Networks (CNNs), continues to be a dominant force in biomedical image processing. It has shown remarkable success in tasks such as image segmentation, detection, and classification.
2. Transfer Learning for Medical Images:
   - Transfer learning, where pre-trained models are fine-tuned for specific medical imaging tasks, has to improve performance on smaller medical image datasets.
3. 3D Image Analysis:
   - Advances in 3D imaging technologies, such as CT scans and MRI, have led to an increased focus on 3D image analysis. Deep learning models are being adapted and developed for tasks like volumetric segmentation and reconstruction.
4. Multi-Modal Imaging:
   - Integration of information from multiple imaging modalities, such as combining MRI with PET or CT, is becoming more common. Deep learning techniques are being applied to effectively fuse and analyze data from different sources.
5. Explainable AI in Medical Imaging:
   - As the deployment of deep learning models in clinical settings increases, there is a growing emphasis on developing models that provide interpretable and explainable results. Understanding the decisions made by these models is critical for gaining trust in medical applications.
6. Generative Adversarial Networks (GANs) in Medical Imaging:
   - GANs are being used for data augmentation, style transfer, and generating synthetic medical images. GANs can help address challenges related to limited labeled datasets in medical imaging.
7. Automated Pathology Detection:
   - Automated systems for the detection of abnormalities in pathology slides, such as cancer cells, are being developed. Deep learning models are trained to identify patterns indicative

of various diseases.

8. AI for Radiomics and Radiogenomics:
   - Radiomics involves the extraction and analysis of quantitative features from medical images. AI techniques, including machine learning and deep learning, are applied to radiomic data for predicting patient outcomes and understanding tumor biology (radiogenomics).
9. Point-of-Care Imaging:
   - Advances in portable imaging devices and the development of point-of-care diagnostics are benefitting from image processing techniques. Real-time analysis of medical images at the point of care is becoming more feasible.
10. AI-Assisted Diagnostics:
   - AI is being integrated into diagnostic workflows to assist healthcare professionals in interpreting medical images. Computer-aided diagnosis (CAD) systems are developed to provide additional insights and improve diagnostic accuracy.
11. Precision Medicine:
   - Biomedical image processing is playing a crucial role in the era of precision medicine. Patient-specific data, including medical images, are analyzed to tailor treatment plans based on individual characteristics.
12. Exosome Analysis:
   - With the rise of interest in extracellular vesicles, including exosomes, there is a focus on developing image analysis techniques for studying these tiny vesicles. This has implications for understanding diseases and developing diagnostic tools.

These trends reflect the ongoing evolution of biomedical image processing, driven by the integration of advanced computational methods with cutting-edge medical imaging technologies.