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SURVEY ON DEEP LEARNING FOR RADIOTHERAPY

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Abstract

More than 50% of cancer patients are treated with radiotherapy, either exclusively or in combination with other methods. The planning and delivery of radiotherapy treatment is a complex process, but can now be greatly facilitated by artificial intelligence technology. Deep learning is the fastest-growing field in artificial intelligence and has been successfully used in recent years in many domains, including medicine.

In this article, we first explain the concept of deep learning, addressing it in the broader context of machine learning. The most common network architectures are presented, with a more specific focus on convolutional neural networks. We then present a review of the published works on deep learning methods that can be applied to radiotherapy, which are classified into seven categories related to the patient workflow, and can provide some insights of potential future applications. We have attempted to make this paper accessible to both radiotherapy and deep learning communities, and hope that it will inspire new collaborations between these two communities to develop dedicated radiotherapy applications.

Keywords:

Radiotherapy

Deep-learning

Convolutional Networks