An open MRI defacing algorithm based on object detection and deep learning algorithms

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Abstract:

The development of mechanistic mathematical models and artificial intelligence (AI) algorithms in neuro-oncology requires the use of medical images that allow us to quantify the size and other morphological characteristics of lesions, their temporal evolution and their response to treatments. This is fundamental both for studies of brain metastases (which occur in approximately 30% of all oncology patients) and primary brain tumors (which account for 3% of all cancer deaths, approximately 3200 in Spain).

High volumes of data, if possible publicly available, are needed to develop mathematical and AI models. However, head images present the problem that patients are recognizable by their facial features, which raises ethical and data protection issues for their sharing, thus slowing down the development of predictive techniques that can be of enormous value for patients.

This talk will present an artificial intelligence algorithm developed to solve this problem, ensuring complete anonymization of the images, with quality results while keeping intact the anatomical brain structures and with calculation times that allow real-time execution of the algorithms. The resulting algorithm improves on all existing packages, which have different limitations. Open mathematical problems related to this technical development and some information on datasets that have been released with this methodology will also be presented. The result is of great interest because it transcends neuro-oncology and can be extended to other types of diseases where head imaging is used such as neuro-degenerative diseases.

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