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Deep nets vs human designed features in medical physics

In medical physics, conventional machine learning uses "hand designed"feature extractors which require great domain expertise. Deep learning has dramatically improved state-of-the-art machine learning in a variety of domains - including speech recognition, visual object recognition, and object detection. Deep learning networks do not need "hand designed"features, but they usually require extremely large data sets. In medical image analysis, large data sets are either unavailable or extremely expensive. In this work we explore the use of convolutional neural networks (CNNs) and transfer learning in a medical physics application with a small dataset (498 images). We compare the results of various CNNs developed without domain knowledge against a system carefully designed by domain experts.

Primary author: INTERIAN, Yannet (College of Arts & Sciences, University of San Francisco)

Presenter: INTERIAN, Yannet (College of Arts & Sciences, University of San Francisco)

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