Submission Type: Education Exhibits

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Radiology & Biomedical Imaging

Primary Category: Radiology Informatics
Secondary Category: Machine Learning and Data Science

Practical Guide to using Deep Learning for Computer Vision Research in Radiology

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TEACHING POINTS

This example driven abstract illustrates practical points of using deep learning for radiology research. We will predict breast density from mammogram data. All code will be made available on Github. Main teaching points are to:

- load & pre-process DICOM data

- design various neural networks using Keras with Tensorflow backend

- train, validate, test, and troubleshoot models

- systematically analyze model prediction errors & report results.

- generalize to related problems

TABLE OF CONTENTS/OUTLINE

Problem Statement

Prerequisite (Concept, Hardware/Software)

Practical Overview of Creating a Machine Learning Algorithm

#1 Load DICOM

#2 Exploratory Data Analysis

#3 Preprocessing

#4 Network Design:

    a) Common Architecture: VGG, ResNet, Inception, Xception
    b) Transfer Learning
    c) Hyperparameters

#5 Model Training & Validation

    a) Underfitting or Overfitting

#6 Error Analysis

    a) Confident and Correct Examples
    b) Confident but Incorrect Examples
    c) Random Examples

#7 Result with Confusion Matrix

Practical Tips for Generalizing to Related Problems

    a) Prob 2: 2D to regression
    b) Prob 3: 2D + clinical variable to regression
    c) Prob 4: 3D to binary classification
    d) Prob 5: 3D to regression

Conclusion

PDF UPLOAD

https://abstract.rsna.org/uploads/2017/17002009/17002009_clxw.pdf

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Disclosures:

Nothing to disclose:	Jae Ho Sohn
Nothing to disclose:	Alex Izvorski
Nothing to disclose:	Marc Kohli

Questions:

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This is an example-driven exhibit that uses data to illustrate practical points of using a data science technique.