Machine Learning - Basi e Sue Applicazioni

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Main topics

- **Machine learning and the «data life cycle»**
  - **Feature extraction**
  - **Feature selection**
  - **Classification**

- Validation and classification metrics
  (or *how to stop worrying and setup the model*)

- Radiomics and radiogenomics

- Deep-learning techniques

- How to build a model suited for
  the medical-data domain

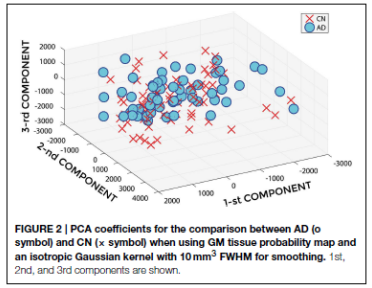

FIGURE 2 | PCA coefficients for the comparison between AD (o symbol) and CN (× symbol) when using GM tissue probability map and an isotropic Gaussian kernel with 10 mm³ FWHM for smoothing. 1st, 2nd, and 3rd components are shown.

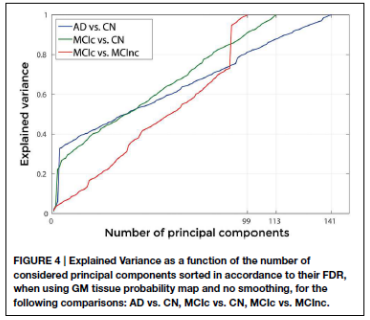

FIGURE 4 | Explained Variance as a function of the number of considered principal components sorted in accordance to their FDR, when using GM tissue probability map and no smoothing, for the following comparisons: AD vs. CN, MCIc vs. CN, MCIc vs. MCInc.

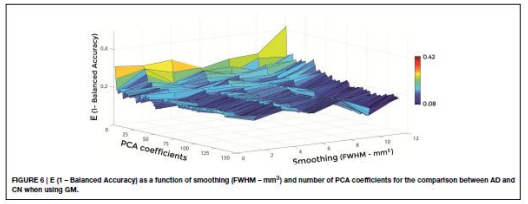

FIGURE 6 | E (1 – Balanced Accuracy) as a function of smoothing (FWHM – mm³) and number of PCA coefficients for the comparison between AD and CN when using GM.

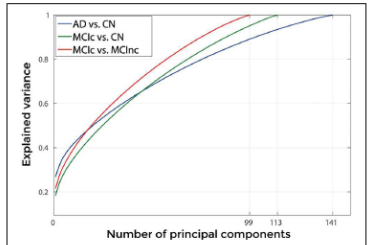

FIGURE 3 | Explained Variance as a function of the number of considered Principal Components, when using GM tissue probability map and no smoothing, for the following comparisons: AD vs. CN, MCIc vs. CN, MCIc vs. MCInc.

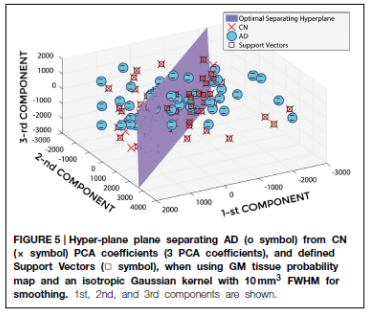

FIGURE 5 | Hyper-plane plane separating AD (o symbol) from CN (× symbol) PCA coefficients (3 PCA coefficients), and defined Support Vectors (□ symbol), when using GM tissue probability map and an isotropic Gaussian kernel with 10 mm³ FWHM for smoothing. 1st, 2nd, and 3rd components are shown.

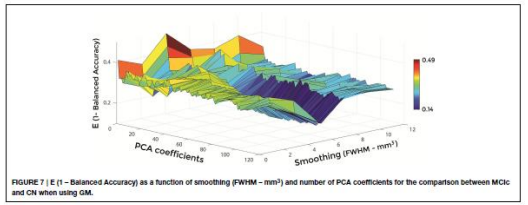

FIGURE 7 | E (1 – Balanced Accuracy) as a function of smoothing (FWHM – mm³) and number of PCA coefficients for the comparison between MCIc and CN when using GM.

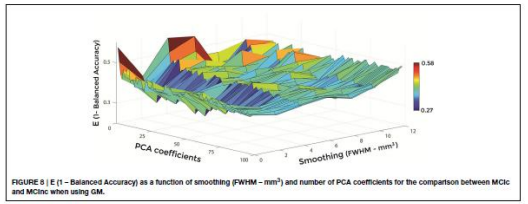

FIGURE 8 | E (1 – Balanced Accuracy) as a function of smoothing (FWHM – mm³) and number of PCA coefficients for the comparison between MCIc and MCInc when using GM.

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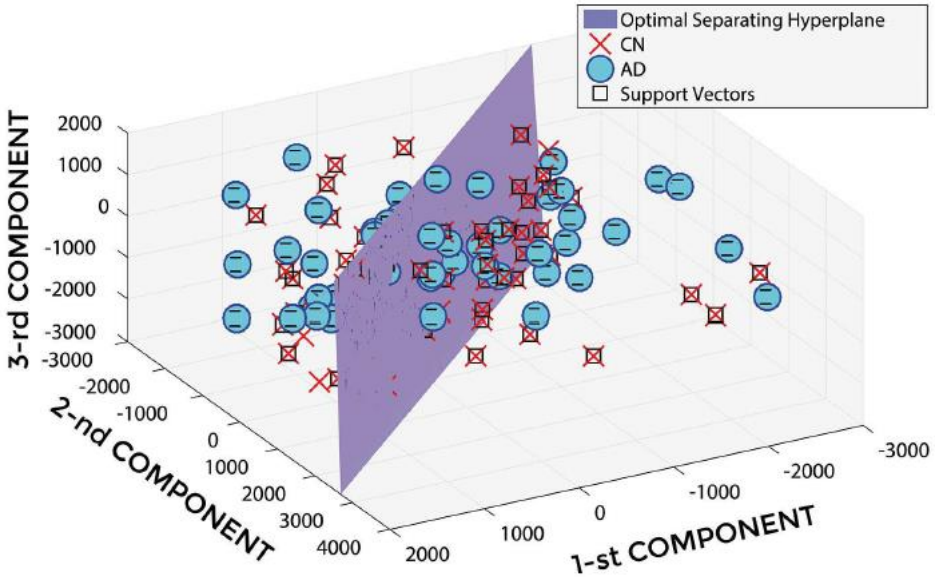

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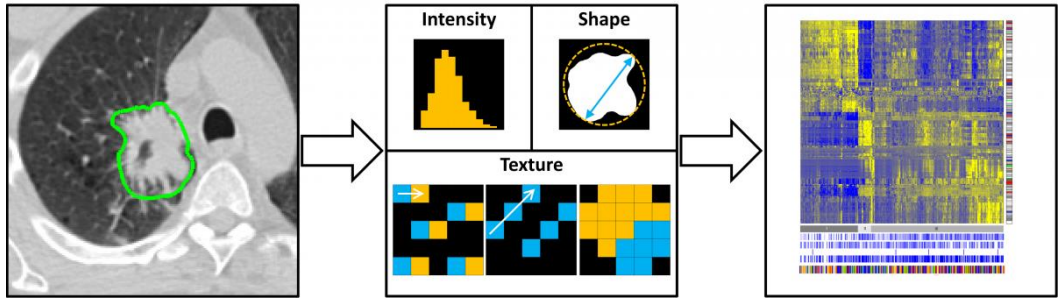

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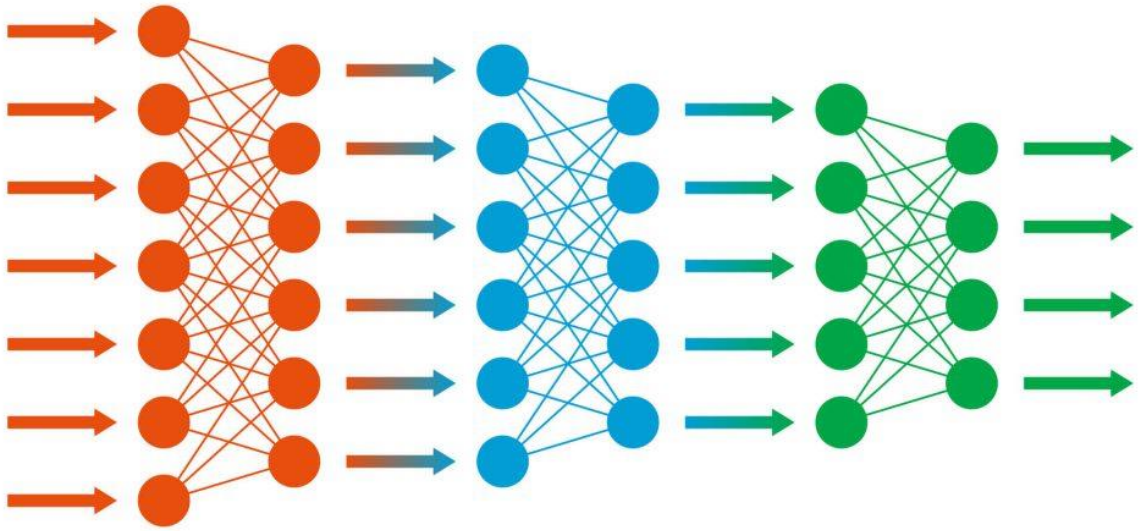

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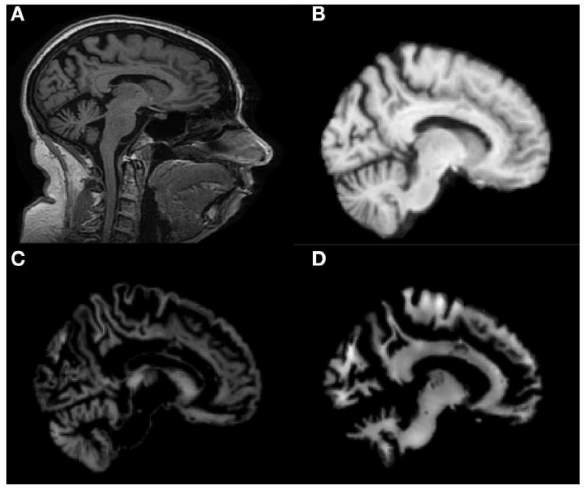

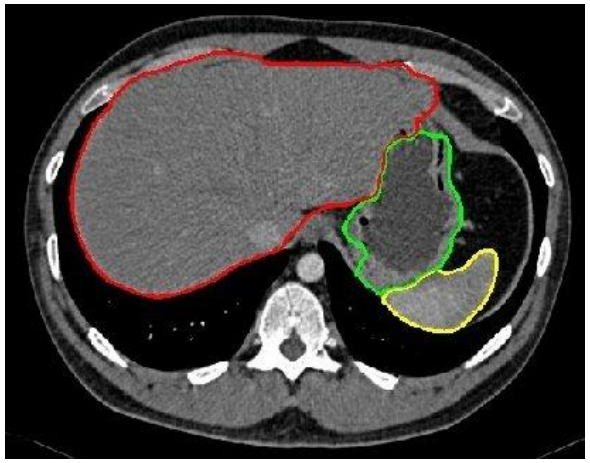

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Requirements

- Basic skills of Matlab and Python

- Updates @ https://christiansalvatore.github.io/machinelearning-iusspavia