Machine Learning for Neuroscience

ML4NS

Slides and notebooks: `https://ml4ns.github.io`

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Lecture 8. Applications of Machine Learning in Neuroscience

In lecture 8, we cover examples of real-world applications of machine learning in neuroscience. We also discuss how concepts from neuroscience have been applied to machine learning. In this lecture, we discuss how neuroscience can inspire new types of algorithms and architectures. We first review the content of previous lectures before expanding further on different sub-fields of machine learning. These include reinforcement learning, deep learning, attention-based learning, and continual learning, citing state-of-the-art works for each.
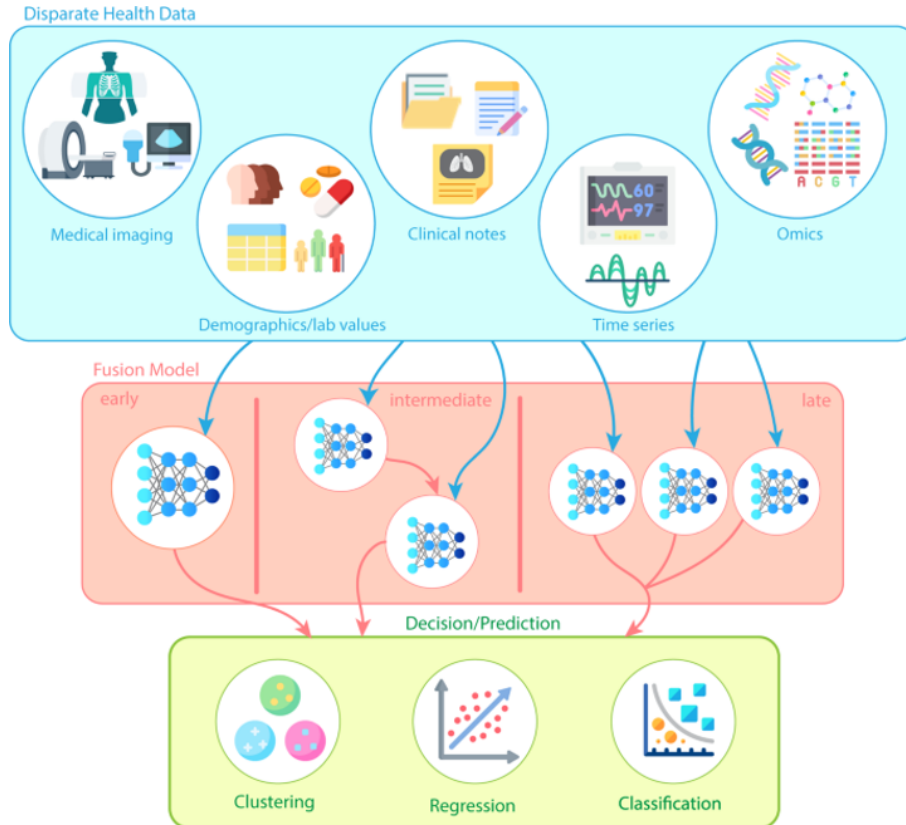

Figure 8.1. Applications of machine learning at different stages of disease
Source: Kline, A., Wang, H., Li, Y. *et al.* Multimodal machine learning in precision health: A scoping review. npj Digit. Med. 5, 171 (2022).
https://doi.org/10.1038/s41746-022-00712-8

We also consider the applications of machine learning in precision health care, from neuroimaging to electronic healthcare record analysis to diagnosis and treatment of diseases to predicting the progression of the disease. Figure 8.1 illustrates how machine learning can be applied in healthcare at different stages of a disease.

Finally, we discuss the practical methodology of machine learning approaches in terms of dimensionality reduction of a dataset and imputation of missing values in a dataset.