Machine Learning for Neuroscience

Slides and notebooks: `https://github.com/PBarnaghi/ML4NS`
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Lecture 8. Applications of Machine Learning in Neuroscience

In lecture 8, we cover some of the 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 provide inspiration for 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.

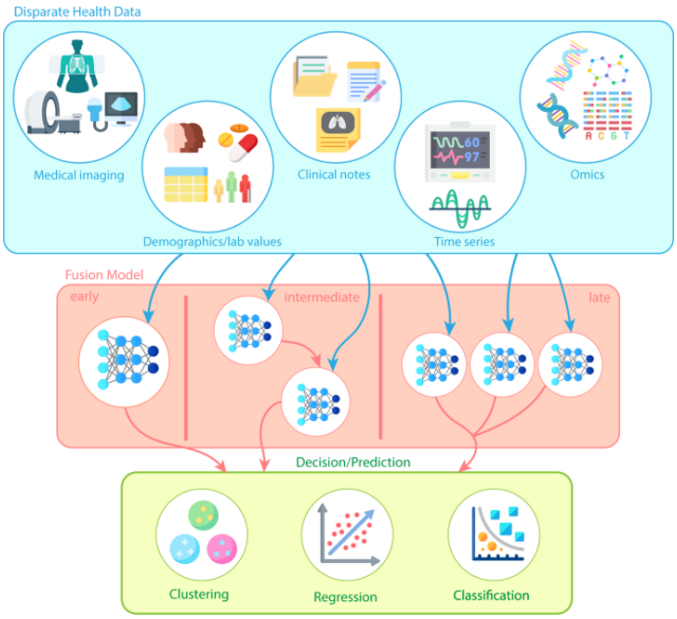

Figure 8.1. Applications of machine learning at different stages of disease
Source: Kline, A., Wang, H., Li, Y. *et al.* Multimodal machine learning in precision health: A scoping review. npj Digit. Med. 5, 171 (2022).

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.

The corresponding assessment will help you to evaluate your understanding of the potential real-world applications of machine learning.

This topic is assessed in conjunction with Topic 9 (Ethical Considerations and Responsible Machine Learning). This assessment will help you to evaluate your understanding of the potential real-world applications of machine learning.