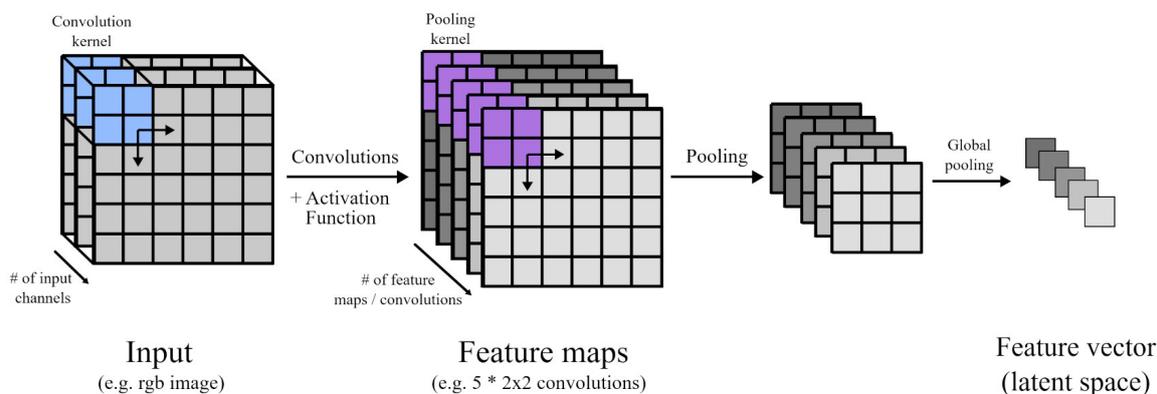




Exploring complex pattern formation with convolutional neural networks

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Neural networks have become essential tools for many applications in data science. Due to their popularity, well maintained open source toolkits are available that make it easy to implement custom models.[1] This has also led to novel perspectives on existing problems in physics. In this presentation we discuss how convolutional neural networks (CNN) can be used to classify patterns in non-linear dynamical systems. As an example, we consider the Gray-Scott model which is well known for its diversity of different dynamic patterns[2] and demonstrate how supervised CNNs can be used to automatize pattern recognition.[3]

[1] https://github.com/coscholz1984/GS_CNN

[2] J.E. Pearson, *Complex Patterns in a Simple System*, Science 261, 5118 (1993)

[3] C. Scholz and S. Scholz, Exploring complex pattern formation with convolutional neural networks, American Journal of Physics (2022) (in print), <https://arxiv.org/abs/2110.07306>