# Deep Learning in Chemical Engineering

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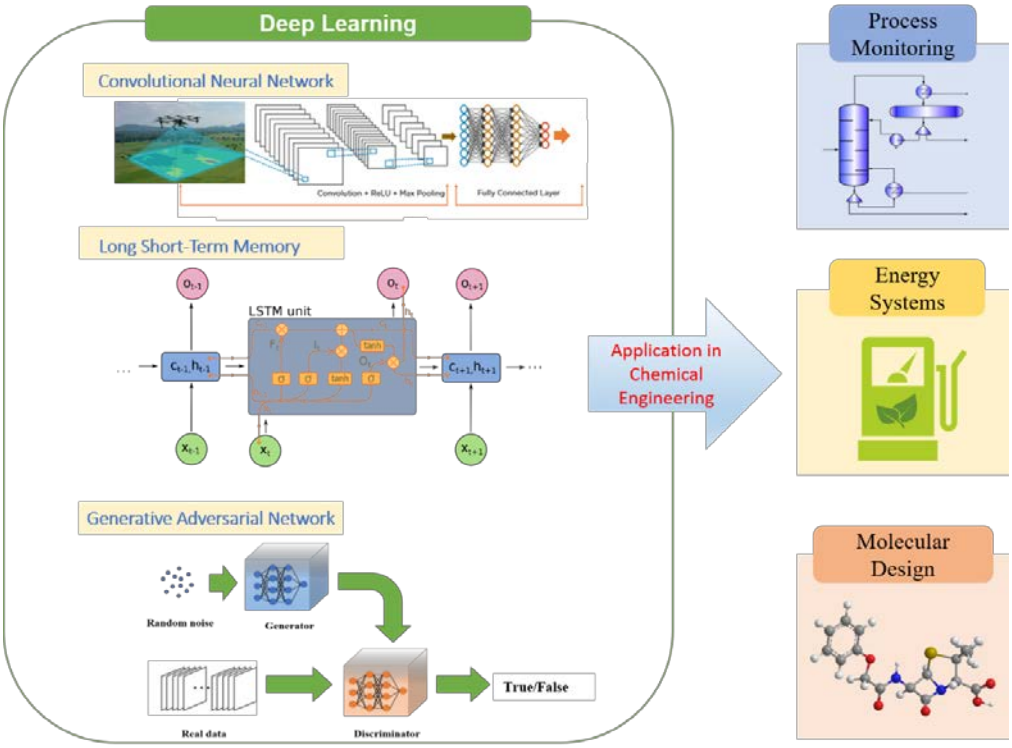
In recent years, deep learning has attracted tremendous attention from both academia and industries, due to its state-of-the-art performance in many areas, such as speech recognition and image processing. Deep learning, one of the most rapidly growing machine learning subfields, demonstrates remarkable power in deciphering multiple layers of representations from raw data without any domain expertise in designing feature extractors. Since it requires very little feature engineering by hand, deep learning can easily take advantage of big data in chemical engineering. With growing amount of data in chemical processes and great advances in computational infrastructure, deep learning holds the potential to revolutionize numerous domains in chemical engineering.




In this project, we will apply deep learning techniques to various chemical engineering problems. Among these, deep convolutional neural network (CNN) will be employed for chemical process monitoring to ensure the safety of process operations. By leveraging the natural gas consumption profiles, we will develop an accurate natural gas consumption forecasting model with long short-term memory (LSTM) neural networks. Additionally, material discovery typically runs with a trial-and-error approach. By exploiting patterns in massive datasets, deep generative models characterize salient features of molecules and greatly facilitate material discovery.