

### **What is an application that current deep learning techniques fit and why?**

One interesting area of research that deep learning can be applied to is Ambient Intelligence. This is the idea of a smart environment that is enabled by the interconnection of smart devices. These devices include anything from home security systems, smart thermostats, smart tv's, mobile phones, and devices like Google Home or Amazon Alexa. Deep learning is well suited to handle this due to the large amount of data that will be generated from the devices. Models built using deep networks only improve as the number of datapoints they are able to train on increases. Additionally, many varying types of devices will generate a large number of features and dimensionality reduction techniques such as autoencoders can be used to reduce the feature set to a manageable number. Since most of this data will be personal or health data, dimensionality reduction can also be used to anonymize the data to improve privacy. Finally, the list of smart devices will include video and sound recording, and deep learning is already well established in the areas of image processing and speech recognition.

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Deep learning models are not well suited to making decisions when they have an ethical or moral consideration. A modern example is self driving cars. While neural networks are able to easily drive a car, interesting questions come up when you put the AI in control of the car and give it a tough choice. An example could be if the car was suddenly faced with a jaywalker, it would have to choose between swerving and endangering the passenger or continuing and possibly hitting the jaywalker. The network could be trained to do any of minimize property damage, always safeguard the passenger, or choose the outcome that amounts to the least injuries. While those are all viable strategies, there is no right answer. Making ethical decisions is not as simple as inspecting the data and selecting the best outcome.