Teaching machines learn the human way

Dr. Srijith P. K.,

Dept. of CSE

KID: 20200220

"Iudicium Posterium Discipulus Est Prioris" - Every day is a student of the previous day! We are in the era of big data, where a large amount of data is generated in the form of text, images, and videos. This deluge of data calls for automated methods of data analysis, and machine learning became a very successful approach to automatically learn from data. My research work aims to develop machine learning techniques for analyzing data from varied domains such as computer vision, language processing, and social networks. I am also interested in applying machine learning to problems arising in science and engineering disciplines like mechanical, civil, physics etc. We develop machine learning models inspired by the way human learning works. Towards this end, we use Bayesian learning, stochastic processes, differential equations and neural networks to develop novel machine learning algorithms. Though deep learning has brought advances in artificial intelligence, they are incapable of modelling uncertainty and are less robust which cause adverse effects in high-risk applications such as autonomous driving vehicles and disease diagnosis. Moreover, they require a large amount of training data and have a cumbersome model selection process. We develop next-generation deep learning models which can overcome these drawbacks with the help of Bayesian non-parametric approaches, for instance, convolutional deep Gaussian processes. We also work on developing Bayesian deep learning models for safe artificial intelligence, natural language processing and continual learning, a fast emerging topic in AI which aims to learn like humans in a continuous manner. Another research interest is on social network analysis, where we aim to develop techniques which can mine information and model activities arising in social media. We developed a system to aid people in disasters such as floods and earthquakes and provides information on resource availability and requirements in real-time. The work received appreciation from government agencies and is covered by various newspapers. We also work on developing statistical models which can predict the behaviour of users in social media like their posting times and can learn the implicit network of influence between them. These models are naturally explainable and interpretable unlike black-box deep learning models and can be useful for a wide variety of problems. We hope to develop learning algorithms and models which are useful not only for artificial intelligence but also in general for problems arising in science and engineering. Please find more information about us in the Bayesian Reasoning And INference (BRAIN) webpage (https://sites.google.com/view/brainiith/home).

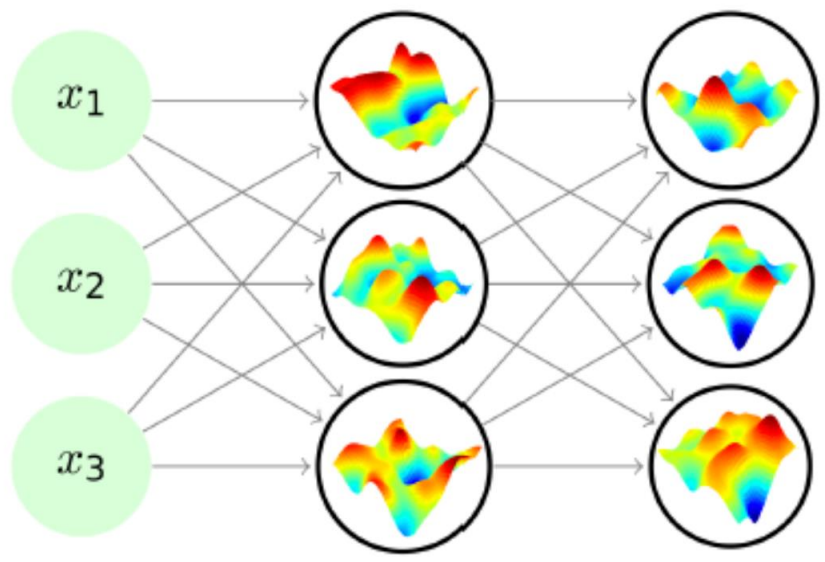

Figure 9: Bayesian deep learning model