Machine Learning Applications

Machine learning is the field of studying computer algorithms that can improve automatically through experience and using data. Machine learning has various applications such as computer vision, in medical field to diagnose diseases at an early stage, retail, speech/text processing, online fraud detection, finance and many more.

Amongst these applications what interests me most is it’s use in VLSI. Since I am a VLSI Engineer, I was in search of some technology that can improve VLSI design flow and launch product sooner into the market. For example, the implementation engineers spend about 10 months to physically place the logic on the target technology like 16nm, 7nm, 5nm, etc. so that the circuit works functionally well before releasing it to manufacturing unit. This process can be improved by using machine learning algorithms and increase productivity of implementation engineers. It is expected that ML algorithms can improve the process by about 2 months, thereby launching the product within 8 months into the market.

So, how can we achieve this? The implementation engineer invests time and effort to figure out timing issues in the circuit. The runtime to generate the timing reports typically takes about 1 week and analyzing and solving them takes about a month. Sometimes they must restart the process if the timing looks worse and cannot be solved by conventional techniques. Now, here comes the role of machine learning which predicts the timing issues in early stage of the process; thereby saving weeks of time and effort. Therefore, ML helps in improving the process and saving time and effort; thereby launching the product earlier than expected. Therefore, many VLSI tool companies like Cadence, Synopsys, etc. are investing huge amount of dollars to achieve this goal.

Another interesting application of ML is stock market price prediction. There are many folks like me who have zero knowledge of stocks and market. For people like me, without financial advisor it would be difficult to invest and enjoy benefits in future. Therefore, the ML algorithm which is already in use to predict stocks helps amateurs like me to invest in stock market and earn some extra amount.

Apart from above applications, retail company heavily use AI/ML algorithms to enhance their business. For example, I was searching for laptops on Amazon the other day and now on the front page of Amazon app, laptops of different brands and similar specifications are advertised which tempts me to purchase one thereby increasing Amazon’s business. The master mind behind this is of course AI/ML. The systems take customers data as input which it processes to advertise products like our search. For example, I searched Dell/HP/Lenovo laptop with 1TB hard drive, and Intel processor and the app is now displaying similar laptops of same configuration with different rates.

Concluding this, there are many other applications of ML, and many are being discovered or invented. This is just the beginning, and many such ML algorithms will be developed that will help us improve life and society.