# Why is DSA imperative before mastering ML/DL?

-Nilotpal Mrinal

*"People think that computer science is the art of geniuses but the actual reality is the opposite, just many people doing things that build on each other, like a wall of mini stones."* - Donald Knuth

Andrew Ng. had once said that "AI is the new electricity." By that, He meant that, like 100 years ago, with the advent of electricity, almost all the industry got revolutionized, in the same fashion, AI is expected to revolutionize. He was correct in what he said but many people misunderstood it(especially among students).

**The Observation**

In my experience of working with machine learning models, I have met several friends and seniors, mentors, engineers, and researchers. Almost everyone agreed that, in recent times, AI has been hyped. But, at the same time, it's hype is justified to a greater extent. The impeccable accuracy in predicting cancer without altering any tissues in the body, the optimizations of scarce resources without iterating the calculations, the prediction and finding the hidden insights from the data, are one of the major factors contributing to the hype.

In the context of India, most of the students pursuing their B.Tech, at least, do give it a try to computer science and especially to data science. Even in most of the colleges, all departments have some basic course in programming. They do so by skipping the most fundamental and crucial courses such as Data structures and algorithms. This is one of the fundamental and the most important courses in computer science to start with. But sadly, most of the students fall prey to the hype and turn-up for learning ML/DL. I have seen plenty of courses both free and paid claiming mastery in ML in 40 hours or 4-weeks. Most of the students do take such courses and end up being frustrated as they don't understand the underlying mathematics or the logic part. As per the Coursera data, hardly 38% of the total people taking machine learning courses were able to complete them. So the pertinent question that arises is "where is the fault?"

**The Fault**

Here comes, the role of DSA. The fault lies as simply as skipping DSA. The mastery of DSA, not only teaches the basics of program flows, but also the patience and the courage to stay determined. Most of the problems at an abstract level, aim to solve a real-life problem. Solving a real-life problem certainly requires a good level of mathematical sophistication to model it into a type and seek for the best solution among many candidate solutions. That is challenging and one who is merely mugging up the functions and packages would certainly succumb. Moreover, in the visualization and presentation of data, manual calculations sometimes become very important to cross-check

the solution obtained by the computer. DSA helps us understand the basics and motivates us to expand our thinking by doing problems. This not only boosts our confidence but also helps in interviews to tackle the coding problem. It also teaches us to design our way of solutions and it is more sort of rule than an exception in DSA.

**The Reason**

The reason for this is quite obvious. In India, the job opportunities and good internships are quite limited to and rarely offered to the students studying in a 3rd tier college. Most students do seek ML/DL as a shortcut and follow a simple rule of "Pay-Participate-Project". In this rule, they often pay to some private firms to get them an internship which is in sharp contrast with what should happen. Most Start-up companies hire undergraduates and around 80% of them will have unpaid internships.

In tier 1 or tier 2 colleges in India, there is a robust alumni network and they assist their juniors in all the possible ways. I am fortunate to have such a mentor. But, In tier-3 colleges*(mostly private institutions, where most of the students go when they don't get a seat in these colleges due to limited capacity)* there is not much evidence of a robust and active alumni network and govt. assistance in research opportunities. This is the major limiting factor as far as I believe. Some private institutions do chest-thumping claims of 100% placement to attract students but the underlying truth is quite shocking. (This is not the motto of this article :) ).

## Conclusion

One, who has mathematical sophistication and has experienced problem-solving in algorithms would find it a cakewalk to get a clear intuition of ML/DL. DSA forms the basic and primitive stepping steps to reach the dexterity in AI. Hence, I would highly recommend having strong problem-solving skills in algorithms to have a better intuition of AI rather than jumping ahead.