LAKNATH'S COLUMN

Ramblings of a wanderer

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JAN 15 2017

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EDUCATION, MACHINE
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THE NECESSITY OF LIFELONG LEARNING

> Live as if you were to die tomorrow. Learn as if you were to live
> forever.
> — Mahatma Gandhi

The term "lifelong learning" sounds nonsensical when you consider that learning from experience is an intrinsic function built into all humans and animals. But today, this term in the context of rapid advances in the field of AI and automation carries a different meaning. This is an attempt at discussing why it's increasingly needed today, and encourage everyone to take up on actively learning and expanding your horizons if you haven't started already.

The pace of technological advancement

The consensus is that what you learn today will be out of date within 5-10 years from now. By that argument alone, it's a no brainer that we should keep learning. The pace of advance is almost tangible when it comes to technical fields and not taking time to update yourself would be a critical carrier mistake. Since my experience is with computer science, this post will focus more on CS but I believe it holds true for most other areas as well.

I doubt there's any other field that's advancing as fast as CS at the moment (definitely subjective:)). Most of us working in the field acknowledge this fact and accept the challenge, and even call it an endearing quality. At any rate, the changing of tools is expected every 5-10 year period in CS so this shouldn't be anything new. However, just changing of tools will not be enough if you want to get into emerging CS domains such as Internet of Things (IoTs), Software Defined Networking (SDN), Deep learning .etc, that generally have strong theoretical foundations. Here, online courses can help in two ways.

1. You probably will need more maths and/or computer science fundamentals such as operating systems, networks, algorithms .etc. This is where MOOCs and especially Khan academy can be of great help. They can help us revise old maths lectures and fundamentals.

2. Once in a while there are wonderful offerings on emerging topics by pioneering researchers, and these courses can really bring you to the "edge" than what you would normally find in a regular class.

Automation and consequences

Marc Andreessen famously wrote sometime ago software is eating the world; now probably it's time to say specifically that artificial intelligence is eating the world, or at least it's going to. With ever increasing computational power and lifelong efforts by some great scientists, today we are seeing very exciting advances happening on weekly basis. Even though it took self-driving cars and Watson to bring AI to the mainstream, AI has been here for almost as long as the computer itself. From coining of the term in 1956, it has undergone through various stages of evolutions. From the golden era of logic based reasoning to the perceptrons and subsequent AI winter through to the advent of neural networks and current deep learning frenzy: AI has indeed come a long way.

There's no question of this wave of AI and automation going to affect the way we work. The question is how much it's going to change; and do we really need to worry? After all, during the last century the world saw some major revolutions in the way humans work and why this should be any different? With every major disruptive innovation, there have been both expiration of traditional jobs and creation of new jobs.

One main difference I see with AI based automation is that it's not trying to emulate a single function like traditionally how it has happened. For example, horse-driven carriage to automobiles, or papers to digital media have revolutionized human civilization as we know it. But in each of these cases they were limited to one specific area. When we think of what's happening today with AI, it's trying emulate some skills that have been intrinsically marked as human territory and doing so to the degree of human precision: cognition and decision making key among them. With such faculties been outsourced to machines, there's no telling of how widespread the affect will be.

While machine learning researchers caution the world to brace for mass outbreaks of unemployment cycles, some opinion the effect will be similar to disruptions happened in the past. While I agree with the former school of thought, I doubt anyone has a good estimation. This is probably why the Whitehouse policy paper for AI discusses on both overestimated and underestimated influences. Indeed some effects are quite unexpected. But looking at how things are going, we can already see some industries like transportation are due for a rude disruption. Here is another estimation of what type of jobs are more prone to overtaking. It can be expected that single-skill jobs will continue to decay while jobs that require social or maths skill will remain largely unaffected or get more demand.

In summary, think we can all agree on that this wave of AI is going to affect how we work, and as the wise say: it's good to be safe than sorry. If you still think this may be into the far future, time to think again.

Technology domain is interconnected

Again this is mostly with regards to computer science, but it may hold true in other fields as well. Today, to get some meaningful work done, you usually need to tread upon at least a few cross disciplines. If you are a software engineer, it's not enough to know the fundamentals and

a few languages; depending on your flavour, it may be into systems, embedded systems. etc or distributed systems, web security, big data and ilk. If you are into data science — a cross discipline to begin with — there's no escaping from learning, from statistics to CS and everything in between! Each of these field is vast on its own and advances rapidly just like most areas in CS. In that sense, the words "Try to learn something about everything and everything about something" is apt today than any other time.

With such a large scope to draw from and a rapidly advancing industry, I doubt any traditional college can satisfy the need no matter how good the degree program is. Fortunately, today we don't have to look beyond our browser to learn whatever the topic we need to learn and the only question is whether we are ready to expand our horizons.

A modicum of balance to a knowledge driven world

With the ever persistent brain drain from developing countries and today's demand for knowledge driven industries, most of the countries are at a severe disadvantage. With the imminent wave of automation, this kind of overwhelmingly biased world doesn't look promising to begin with. Luckily, some very wise people, who are also happen to be leading machine learning researchers, kicked off the drive for today's online learning initiative in parallel to the rise of AI (this is not anyway discounting the wonderful service rendered through MIT opencourseware prior to the arrival of MOOCs). So it's not an exaggeration to call such learning initiatives as great equalizers in education and a step towards improving world's future living standard. As with everything today, some of them are increasingly getting money driven now, but still they have started something that could change the world for the better.

What should we learn

Little humble bragging: I was an early adaptor into MOOCs (as they were coined later) in 2011 and finished both Prof. Andrew Ng's first online machine learning course, which went on to become Coursera, and the first intro to Artificial intelligence course by Prof. Sebastian Thrun and Peter Norvig, which was the start of Udacity. From then to date, I took part in many courses, but as the norm with MOOCs finished only a dozen or so in truth. Anyway, I'd say I have a fairly good rapport with MOOCs as you can get, and would like to share few tips solely based on my subjective experience.

When it comes to learning, you can spend time on lots of things very similar but gain very little in return. In that sense, the classic "Teach Yourself Programming in Ten Years" by Peter Norvig is something everyone should read on what to learn.

Another lesson I learnt is that even though courses are free and limitless, your time is not. So even though a course is really interesting, I now carefully take time to decide whether that'll help me to expand my knowledge in something I really need. Also rather than trying to keep up with bunch of courses at once and not getting anything fully done, restricting yourself to few depending on your schedule and fully concentrating on them is far better. Again, this is a no brainer, but our impulse is to grab everything free.

Another recent development is all the online services are introducing specializations and mini-degree programs. I have doubts whether this is the best way to go from a learner's point of view. One of the advantages of online learning is that you are not restricted by any institutional rules to select what to learn or from where. But with this type of mini-degree programs, we are again bringing in traditional restrictions to learning. Instead I'd prefer to select my own meal, and if they are really good, pay for them or audit until I'm convinced. But again, this is very much subjective.

In conclusion, learning is an intrinsic function built into everyone. But with this new order of the world, learning has turned into a fast track lane and if we don't catch up to the speed, world may move forward leaving us stranded.

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