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2017 ICME Commencement Speech

Introduction

It is a great honor for me to be here with all of you today. I would like to start by thanking Professor Margot Gerritsen and the ICME Faculty and Staff for the opportunity, and congratulate parents and family of ICME graduates, and of course our Newly ICME grads.

Today is a very special day for you – it is the last day you will be an ICME student at Stanford. Or, if you are like me, it is the day you decided that not being done writing that last chapter of your thesis is no excuse for skipping your commencement ceremony. For those of you, who decided to do as I did, let me tell you, there is no better motivation to finishing writing that thesis than knowing that everyone thinks you already did.

As you're about to start the next phase of your career, I would like to share with you why I believe this is a fantastic time to be graduating with a degree from ICME, and how it is an exceptional foundation for a very successful career.

1.- Big data is everywhere, and it's getting bigger

According to publicly available sources, and some back of the envelope calculations, by the end of this speech, 200k people in America will have visited a Walmart store, 2M photos will have been uploaded to Facebook, 38M queries will have been issued to Google, and Tesla will have collected the equivalent of 4 full years of driving through its auto-pilot enabled cars. And that is only 10 minutes.

Making sense of all that data sparked a renaissance in computational sciences, culminating in the democratization of heavy-duty computational resources. Today, with a few lines of code, you can create products that rely on sophisticated computational modules, such as object recognition, that, in the past, were only available to a select few companies.

Contrast that to how things were when I graduated in 2009. The startup I joined then had its own data centers and used custom-built numerical solvers. Talk about a quickly changing landscape.

This has elevated data to be an integral part of modern product development, thus creating the need for data architects and data strategists. Your technical knowledge suits these needs nicely: you are able to understand the strengths and limitations of existing and new computational resources.

I mentioned that big data is getting bigger, and that is important as well. You are uniquely equipped to build new data modeling and processing systems – this is one of the key

differentiators of ICME! This skill is one that will be in high demand in the future.

Consider a modern jet turbine. Did you know that manufacturers, such as Pratt and Whitney, rent turbines (instead of selling them)? They do this by creating just-in-time preventative maintenance for their products, driven through predictive modeling from data collected while operating the turbine. To do so, they need to process thousands o times more data than that collected by social networking sites in 2014. Imagine the type of modeling, system, and computing that is needed to make sense of the collected data! You will have a front-row seat in the development of such systems.

Next, I want to focus on how you gained your ICME skills, and on the importance of intellectual flexibility.

2.- Maintain your intellectual flexibility

As you stand here, you have acquired, without knowing, intellectual flexibility. At more than one point throughout your time in ICME, you had to juggle between the implicit function theorem and condition numbers, Wolfe conditions and stable matchings, numerical viscosity and Brownian motion. And that does not even account for that third course you took each term, where some learnt about filtrations, and other about hardness of approximation. Studying a diverse set of mathematical subjects at the same time stretched your minds.

This acquired intellectual flexibility will prove invaluable in your career. It will allow you to jump into new technical fields. From machine learning to deep learning, from experimental design to counterfactual analysis, your intellectual flexibility will ensure you're continuously part of an exciting technical journey. Cultivate it.

I regularly rely on this flexibility to immerse myself in non-technical subjects, which leads me to my next point:

3.- Data Science needs leaders!

And not only of the technical type. Data science today sits at the intersection of product development and corporate strategy. As data science methods become more pervasive in industrial applications, there is a growing need for cross-functional leaders that understand what can and cannot be done through available methods.

While at ICME, whether you were a consultant for "Computational Consulting", a Teaching Assistant, or a member of a study group, you had to quickly learn to understand someone else's challenges in order to help them best. As a result, you developed a deep sense of intellectual empathy: you had to take a step back from your own knowledge, and try to imagine the question / problem from the other person's knowledge vantage point. As you worked with others, you also learned to communicate while adjusting your discourse to the technical background of the person in front of you.

You might wonder, how likely are you to be called to lead. A lot more likely than you might think - the availability gap in leaders that understand data science is ten times larger than the gap in data scientists! And you know there is a huge market for data scientists.

When the leadership call comes, the intellectual empathy and cross-disciplinary communication skills you've gained will make you a great cross-functional leader. Get ready to lead!

4.- Create diverse environments!

Moving on, let me begin with an observation: for most of us, we will be the only computational mathematician in any team we join. Unless, of course, you join my team, then there will be two of us 😌.

I see this as your biggest opportunity: as you learn to navigate your new environment, become an agent of change, and make that environment one where the value of diversity is well understood, and where breaking out from the mold is strongly encouraged. Create diverse environments!

While at ICME, you evolved in such an environment, where academic and intellectual diversity were the norm. It is likely that the vast majority of students you interacted with here studied something different than you. By now, you are used to the value of being in such an environment: the richness of questions and ideas that arise from a diverse group is remarkable, usually leading to more robust solutions.

It is my experience that this value translates into an industrial setting. I have observed this over the past 8 years, while working closely with people from 15 different countries.

Just like ICME was a welcoming, exciting new place for you to explore intellectual and academic diversity, transform, if needed, your next professional destination so that it benefits from, and fosters diversity. The products you build will be better, and your new destination will be stronger thanks to you.

Now, you might wonder – how does one promote diversity? For me, the answer came from a collaboration with ICME. Early in 2015, Professor Margot Gerritsen, Karen Matthys, and I dreamed of putting together a technical Data Science conference that would encourage women to join or stay within the ranks of data science professionals. Our thought was that, through this conference, we could provide a source of inspiration for the participants, and a tangible set of role models for all to follow.

To-date, we have reached tens of thousands of women across 75 countries. And we are only getting started. Things tend to scale really quickly here in ICME. Simply put, we followed our dream and made it a reality. Please do share your dreams with the ICME community; we might be able to help you realize them.

Conclusion

I hope that I conveyed how, for me, ICME gave you more than a set of technical skills. It provided you with the means to be a lifelong learner, a leader, and an agent of change. And, above all, it provided you with a community you can rely on to pursue your passion.

Congratulations on your graduation!