How Should Data Science Education Be?

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ABSTRACT

The interest in data science is increasing in recent years. Data science, including mathematics, statistics, big data, machine learning, and deep learning, can be considered as the intersection of statistics, mathematics and computer science. Although the debate continues about the core area of data science, the subject is a huge hit. Universities have a high demand for data science. They are trying to live up to this demand by opening postgraduate and doctoral programs. Since the subject is a new field, there are significant differences between the programs given by universities in data science. Besides, since the subject is close to statistics, most of the time, data science programs are opened in the statistics departments, and this also causes differences between the programs. In this article, we will summarize the data science education developments in the world and in Turkey specifically and how data science education should be at the graduate level.

KEYWORDS

Data Product, Data Science, Education, Recommendation System

INTRODUCTION

Coal and steam power in the First Industrial Revolution, which began at the end of the 18th century; Gas and oil in the Second Industrial Revolution, which began at the end of the 19th century; nuclear energy, electronics, computers and computing in the Third Industrial Revolution, which started in the late 1960’s, played very important roles. The Fourth Industrial Revolution (Industry 4.0), which started today, is most likely to be remembered by words such as data, IOT, and AI. The incredible size of data is one of the most important factors that provide the vitality of the Fourth Industrial Revolution. The size and importance of the data have brought us a new field of data science.

What is Data Science? At first Data Science continues to evolve and that’s why it has many definitions: “Data science is making data to tell its story” (Loukides, 2012), “Data Science has emerged as a field that encompasses elements of statistics, computer science, and domain-specific knowledge” (Dyk, Fuentes & Wickham, 2019), “Data science is a multidisciplinary blend of data inference, algorithm development, and technology in order to solve analytically complex problems” (“What is Data Science?”, 2019). Also, we should add these definitions “structured and unstructured
data” concepts because data cleaning or structuring data is crucial in data science, and takes a long time in data science projects.

If we want to develop our students’ the ability to extract value out of data, we need data science. Data Science has an interdisciplinary approach: mathematics, statistics, and computer sciences are all in this field. Therefore in Data Science, it is especially important to build a “data science mindset” and make them think critically and make decisions as a group (Stenhaug, 2019).

The labor markets are changing dramatically. “The Jobs Rated report has tracked for almost 30 years, and in that time, the labor market is changed dramatically. Some of the careers ranking among the Top 10 best jobs of 2017 illustrate these changes. Careers in mathematics rank highly, with Statistician, Mathematician, and Data Scientist all in the top 10” (“Jobs Rated Report 2017: Ranking 200 Jobs”, 2019). According to employment requirements in data science, “in universities in all countries worldwide, in recent years, there has been a very great increase in graduate level courses in Data Science, and increasingly also in undergraduate level courses” (Murtagh & Devlin, 2018). These lines show us that the future of data science will be bright.

The number of data collected is increasing exponentially, and we can expect that the amount of data collected and stored will increase further in line with current technological advances such as machine learning and cloud technologies. Under these conditions data, which is the fuel of data science and the need for expertise to analyze these data can be said to be even more important in the future. Besides, organizations will increasingly realize the importance and value of data, and their need for the data science will also be increased. As a result, “Big Data analytics and Data Science will have growing importance with the Internet of Things, and smart cities and smart homes.” (Murtagh & Devlin, 2018).

“Data science is not yet a field” (Gutierrez, 2014). Says Chris Wiggins, Data Science Director of The New York Times and Associate Professor of Applied Mathematics at Columbia University. While it is controversial whether data science is yet an area, many journals are publishing studies about “data science” and scientific meetings are held by universities and firms. Despite the fact that the problems of the statistics education still have not been solved (due to we have focused exceeding on collecting and reporting, we do not have people well trained in the synthesizing, analyzing and interpreting roles), now we are dealing with data science education problems such as “How data science education should be?”

Data science education draws massive attention from most of the countries. For example, Shiga University in Japan proposed the formation of a new faculty of data science in 2014 (Takemura, 2018). China also goes fast. “Among these majors, Data Science and Big Data Technology are relatively new, as they were established by the MOE in 2015. The first three universities approved to offer Data Science and Big Data Technology programs are Peking University, University of International Business and Economics and Central South University. A year later, MOE approved requests from 32 additional universities to develop Bachelor’s degrees in Data Science and Big Data Technology” (Zhang, Fu, Wang & Yin, 2017).

“Here is a question: why are universities so obsessed with pointless data?” says The Guardian (“Student surveys are a waste of everyone’s time”, 2019). It is known that most of the times universities collect, but do not use data. Artificial intelligence can also make significant contributions in this field. The effect of the real power of artificial intelligence on education will be the processing of large-scale data on students, teachers and their interactions (“Artificial Intelligence Promises a Personalized Education for All - The Possibility Report”, 2019).

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