The impact of how Pearl formalized complex probability models
Seminar: Turing Award Winners

anon.
University of Basel

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Abstract

With his invention of Bayesian networks and further basic concepts in the topic of causality, Judea pearl laid a solid basis for a handful of research fields and areas like artificial intelligence, engineering and several social Sciences. Pearl made it possible to formalize and visualize complex probability models and for that make a lot of concept more accessible and better to communicate. The goal of this paper is to narrate Pearl's journey to his created in a way appropriate for the aimed audience of bachelor students in Computer Science and other audiences.

1 Introduction

In this paper we will present the most important work of Judea Pearl that lead to naming him the Turing award winner of 2011. To provide the proper context we will look at Judea Pearl's work in Heuristics, Bayesian Networks and Causality in a chronological because it all builds up on another. Additionally we will not only look at Pearl's achievements in Science but also at the person behind it all to be able to see the whole picture.

2 Background

2.1 Pearl's influences

On September 4th 1936, Judea Pearl was born in Tel Aviv, Israel. He grew up in an educationally pretty special environment. Because of the Nazi-Regime in Germany many Jewish professors from renowned Universities had to flee the country and many of them settled down in Israel.
With no perspective as a Scientist in Israel all these highly educated individuals started teaching in High Schools with a completely different mission. They had in mind to spread their knowledge as widely and as good as possible to build another generation of exceptional Scientists so they can go on and do what the Teachers would never again be able to do. By preparing their students to be eager to quest for the unknown and publish papers they enabled them to live the dreams they had themselves.
In an Interview with the Science Network (1) Judea Pearl mentioned how the teachers were able to motivate them to learn everything about Science in chronological order and put the problems scientists had at a specific time into the proper context.

2.2 Beginnings

After serving for the Army Pearl studied engineering at the Technion (Israel Institute of Technology). After receiving his Bachelor in Electrical Engineering he moved to America and got Masters in Electronics, Engineering and Physics. Followed by his Ph.D. in electrical Engineering. After working in industrial research for some time Pearl joined the University of California LA (UCLA) as researcher. First in the faculty of Engineering systems, later in the Computer Science Department where he became a full professor in 1976. To this day Judea Pearl is still working at the Cognitive System Laboratory he founded.

2.3 Heuristics

3 Bayesian Networks

Bayesian Networks are an approach developed by Dr. Pearl to have a defined syntax for multivariate probability models. It enables to have a better overview over the con-

nections of the different factors. The basic idea is to be able to visualize and capture as much causal information as possible.

4 Causality

The concept of Causality came into play Because Bayesian Networks only can project a limited amount of causal information.

5 Feedback

I am sorry for not being able to hand in a proper paper with the most important things there already. Because of my poor Time Management I was not able to formulate the most important sections of the paper: Bayesian Networks and Causality but also the Heuristics part.

References

[1] Dr. judea pearl 2011 acm turing award recipient. Youtube. https://www.youtube.com/watch?v=JQr0LFvR1OE.