

Anat Etzion-Fuchs – Statement of Purpose

Whenever I read about a well-known figure who died of cancer, I wonder what would have happened if all the bright minds developing the next shiny gadget had tried to cure cancer instead. Today, computerized systems play an instrumental role in solving complex problems in biology and medicine. Following my passion for both computer science and life sciences, I chose to study bioinformatics. My insight from my BSc studies led me to believe that this area holds tremendous potential to develop innovative solutions that can impact people's lives and health. I am keen on further studying and conducting research in this area, and I believe that the Princeton University's PhD program in Quantitative and Computational Biology is the ideal place to pursue this objective.

Already in high-school I majored in both computer science and biology, developing my programming skills alongside my special interest in genetics. During my military service in Israel, I continued on the programming path and served in one of the most elite programs of the Israel Intelligence Corps in the field of cryptography. My first research experience occurred during my military service. I was responsible for analyzing a massive amount of data whose quality was questionable. I had to distinguish the important from the non-relevant, and use computational methods to infer concrete facts and conclusions. I was very passionate about my work, and enjoyed the freedom I had to pursue my ideas. I also cherished the collaboration with a group of people, each one an expert in a different domain, working together to achieve a mutual result. That was the first time I thought of becoming a researcher.

Later, following my two passions, I decided to study in the Bioinformatics track of the CS department at the Technion - Israel Institute of Technology. I was admitted to the Technion on a full scholarship awarded by the prestigious "Lapidim" program, which is aimed at students who excel in computer science and also present strong management and entrepreneurship skills. The program features lectures and hands-on workshops in the university and in high-tech companies such as Microsoft, Intel and Elbit. Participating in the program exposed me to the research conducted in industry and in the CS department, and the importance of collaboration between academia and industry. This knowledge led me to realize that research can combine both theoretical and practical aspects, and benefit from leveraging connections with relevant industry or healthcare organizations. Graduating summa cum laude, I was ranked first among the Bioinformatics graduates, and ranked 12th of 224 CS graduates.

During my studies, I especially enjoyed computational big-data courses, including AI and statistics, and molecular life science courses, including human genetics and endocrinology. I have come to realize that constructing groundbreaking methods and technologies in the medical world requires both deep knowledge and experience in handling big-data computationally, as well as comprehensive molecular understanding. I used the knowledge gained in those courses in two research projects I took part in. The first, under the supervision of Professor Tomer Shlomi, involved identifying novel genomic mutations. This project exposed me to the fascinating field of medical data analysis, which is becoming increasingly important due to the continuous flow of information uploaded to the internet. In this project I analyzed data from the International Cancer Genome Consortium (ICGC). I learned about the challenges associated with handling large volumes of medical data, and about the rigorousness required to construct valid results.

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The second research project was supervised by Professor Yael Mandel-Gutfreund and her PhD student, Inbal Budowski-Tal. My contribution lay in adding a new feature to an algorithm in the field of computational geometry. The algorithm was designed to classify protein structures and predict their functionality. I also participated in the meetings of the on-going research group, analyzed the results, and suggested ways to improve the algorithm. My results will be included in a paper to be published about this algorithm. This project provided me with the unique opportunity to be a member of a research lab and learn about the dynamic nature of academic research.

During my senior year, I was the first undergrad student from the Technion to win the Google Anita Borg scholarship, awarded annually to excellent female students in CS. In Zurich, at a retreat for all the winners at Google's headquarters, I had the opportunity to network with computer scientists from around the world. I enjoyed the chance to discuss my thoughts and areas of interest, and saw how a multicultural environment can yield the best ideas. I am looking forward to studying at Princeton, where I will be able to interact with a diverse group of talented faculty and students.

Currently I work as a software engineer at Qualcomm Israel, after being an intern for two years during my studies. I have been working on large scale projects and enhancing my programming skills beyond the level obtained during my undergraduate studies. I am also acquiring proficiency in development methods, and enjoying the work in a multi-national corporation. These qualities will be vital for the new computational tools I intend to construct as part of my research.

Princeton has an exciting interdisciplinary program that is exceptionally impressive. In particular, Professor Mona Singh work on predicting proteins' interactions and functions complements with my own interest in studying the proteins' structure-function relations. I am greatly intrigued by Professor Josh Rabinowitz's research in cellular metabolism which is another domain I wish to explore. My long-term goal is to reshape the way we receive medical help, and the way we match treatments to patients. I believe that through computational methods we can achieve great advances in the area of personalized medicine. Princeton's QCB program would be the perfect framework to combine my passion towards computer science and my love for life sciences into a fruitful research that will hopefully have a true impact on people's lives.

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