Workshop in Biostatistics
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| DATE: | April 9, 2020 |
| TIME: | 1:30-2:50pm |
| TITLE: | Learning for Never-Before-Seen Biomedicine |
| SPEAKER: | Sheng Wang  
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Abstract:

We are all going through a hard time with COVID-19. In fact, COVID-19 is just the tip of the iceberg with many other unsolved biomedical problems, such as cancer early identification and finding side effects of new drugs. These problems seem to be independent of each other and have so far been tackled by different biologists. In this talk, I will argue that, behind these different problems is the same computational challenge, that is, how to understand and predict in never-before-seen situations. In addition to powerful predictive models, what is really needed are tools that generalize well to new drugs, new diseases, and new cohorts.

My talk will focus on our novel machine learning method developed to tackle two kinds of never-before-seen situations: never-before-seen class and never-before-seen cohort. I will first introduce how we classify samples into never-before-seen classes by embedding noisy and large-scale biomedical ontologies, resulting in new discoveries in protein functions, cell types, and rare diseases. Next, I will introduce our solution to understand and characterize a never-before-seen cohort. Instead of finding which features are important, we answer the question of why these features are important using a novel multiscale biomedical knowledge graph. This multiscale knowledge graph is constructed using millions of scientific papers and millions of experimental associations, providing up-to-date and scalable evidence for observations in our multi-scale biomedical world. I will conclude with a vision of future directions for never-before-seen biomedicine.