



Invitation to MTech Thesis Defense of Shivam Sharma: February 28, 2018 (Friday): 16.00-17.30 IST

In Partial Fulfillment of the Requirements for the Degree of
M.Tech CB

Shivam Sharma (MT17147)

Will defend his thesis

Title: "Personalised antibiotic prescription in urinary tract infection"

IIIT-D Faculty and Students are invited

Date: February 28, 2018 (Friday)

Time: 16.00 – 17.30 IST

Place: CB Meeting Room (3rd Floor, Old Academic Building)

Examiner: **Internal:** **GPS Raghava**
 External/Internal: **S. Ramachandra, IGIB**
 Advisor: **Debarka Sengupta,**

Abstract

"Urinary tract infection (UTI) is commonly diagnosed in several health-care settings with reported high diagnostic error rates. As per the standard treatment procedure of UTI, urine sample of the patient is collected and sent for a Culture and Sensitivity (C & S) test. However, it takes one to three days for the results to arrive and in its absence, physicians rely on their experience and static clinical guidelines in prescribing antibiotics. Such empiric treatment approaches often disregard patient specific attributes and changes in the antimicrobial resistance patterns

over time and location, which in turns fuels antimicrobial resistance. This study aims to render clinical decision support for personalized antibiotic prescription by predicting patient specific antibiotic sensitivities. We performed a single-center retrospective cohort analysis of 50142 antibiotic sensitivity tests performed across 5082 positive urine cultures. We first tracked the levels of resistance across a wide spectrum of antibiotic and bacteria pairs. The majority of the UTI causing bacteria were found to be resistant against the frequently used drugs like amoxicillin+clavulanic acid, cefotaxime, and ciprofloxacin. We performed a multivariate association analysis between patient features and infection-causing bacteria types. Patient features included demographic information, comorbidities, the interval between admission and sample collection, department etc. We retrieved a number of clinically relevant relationships due to this analysis. For instance, Staphylococcus aureus was found to be prevalent in daycare patients. Such insights may guide awareness initiatives as part of the hospital-specific antibiotic stewardship programs (ASP). Finally, we investigated if antibiotic sensitivity can be predicted at the level of individual patients. For this, we leveraged many of the patient-attributes as mentioned earlier to predict antibiotic sensitivity. We developed a K-nearest neighbors based algorithm that provided superior prediction accuracy (about 75%) as compared to a number of off the shelf techniques. We demonstrate how some commonly recorded patient attributes can be used for personalized prediction of antibiotic efficacy, which in turns augments empiric therapy against UTI."