

Master project description – Ayoung Jang

1. Introduction to Research Project and Problem Statement

Monitoring antimicrobial susceptibility is a core element for the appropriate treatment of bacterial infections and the implementation of infection control measures.

The project aims to provide information on local, regional, or national resistance profiles and changes in MIC levels over time by continuous analysis of data from clinical samples from one laboratory or several laboratories.

2. Method and Material

The project will investigate different statistical approaches (e.g., Bayesian network [1], survival analysis [2]) to implement the prediction algorithm for reduced susceptibility to antibiotics.

The training of our prediction algorithm is based on interval-censored data provided by the existing paper [2] and/or data from the hospitals in Scandinavia.

3. Objectives and outcomes

The project outcome will be as follows

- A framework/ algorithm to predict the change of MIC based on censored data over time
- Graphical presentation of the original and predicted data that make the results more easily accessible.
- A master thesis contains theoretical backgrounds, a literature review, a problem statement, methods, results, and discussions.
- A GitHub code repository for the developed framework/code package

4. Schedule/timetable

Time plan	7	8	9	10	11	12	1	2	3	4	5	6
Learning background												
Duplicate / Implementation												
Apply algorithm to available censored data												
Optimizing / Tuning the algorithms												
Graphical presentation												
Writing Report												
Revision												

5. Supervision team

- Assoc. Prof. Vi Ngoc-Nha Tran (main advisor), Department of Computer Science, UiT The Arctic University of Norway
- Prof. Lars Småbrekke, Department of Pharmacy, UiT The Arctic University of Norway

6. Relevant reading material

[1]. Zhang M, Wang C, O'Connor A (2021) A Bayesian approach to modeling antimicrobial multidrug resistance. PLoS ONE 16(12):e0261528. <https://doi.org/10.1371/journal.pone.0261528>

[2]. Michael A, Kelman T, Pitesky M. Overview of Quantitative Methodologies to Understand Antimicrobial Resistance via Minimum Inhibitory Concentration. *Animals (Basel)*. 2020 Aug 12;10(8):1405. doi: 10.3390/ani10081405. PMID: 32806615; PMCID: PMC7459578.

Tromsø, June 21, 2023

A handwritten signature in black ink, consisting of a large, sweeping initial 'V' followed by several smaller, stylized loops and a long horizontal stroke at the end.

Vi Ngoc-Nha Tran