

## Assignment 3

**Due on 8<sup>th</sup> May 2024**

In assignment 3 you will have to demonstrate the application of the following approaches to real-life problems. Some examples are provided with each of the approaches, however, you are free to choose any realistic problem. Submit your code and a report (only softcopy 4 pages max. excluding references).

**Topics** (select only one from the given list):

1. Tracking a moving object in a video using a **Kalman Filter**.
2. **Dynamic Bayesian Network + Particle Filtering** for data association problem. Data association problem – the problem of associating observations data with the objects that generated them. This problem can be associated with keeping track of many objects in a video. More details are available in the book, chapter Prob. Reasoning over time (Third Edition, not the global edition).
3. **Dynamic Bayesian Network** for the problem of anomaly detection.
4. **Expectation maximization** for clustering and comparison with any non-parametric approach.
5. Implementation of a simple game using **Adversarial Search**.
6. Feature Selection using **Searching Techniques**. There are three broad categories of feature selection methods, filter methods, wrapper methods, and embedded methods. This assignment will focus on wrapper methods as these methods use searching techniques to find the required subset of features. Compare two searching techniques.

### **Code and Execution [20 Points]**

The methods are required to be implemented by you preferably in Python. Apart from the main methods, you can use built-in functions for other tasks for example, data preparation and preprocessing, output generation etc.

Submit the main files, read me, and a wrapper function which will take the input, execute the main program and display output or provide a user interface to do the same.

### **Report [10 Points]**

The report needs to contain:

- Problem definition
- Input/Data Description
- Solution description / Implementation details
- Output/Results
- References.

Note that some topics and problems are more complex compared to others. So, marking will be done accordingly.