MA5710: Assignment-6

Course Teacher: Prof. S Sundar

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Instructions :

- Please do not copy. Any sign of copy will lead to zero marks only.
- Submit all your findings as report in a single .pdf file to **ma19d201@smail.iitm.ac.in** within **27th November**

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1. Let $\{Y_n\}$, $n \geq 0$ be an i.i.d sequence of Bernoulli(p) random variables for some fixed $p \in (0, 1)$. Let $X_n = Y_{n-1} + 2Y_n$ for $n \geq 1$. Prove that X_n is a Markov chain. Figure out the states. Determine initial distribution and transition probabilities.

2. Choose some suitable value of p for Q1 and simulate the above Markov chain in Python/Matlab. Write a general script that evaluates whether a given Markov chain converges to steady-state or not. If it converges for Q1, then print the steady-state probabilities and the no of steps it took to converge. Write the logic behind your code as well.

3. What is the relation between the Poisson process and the Continuous-time Markov chain? Give an algorithm to simulate a Continuous-time Markov Chain. Use that algorithm to simulate a Poisson process in Python/Matlab. You can choose the parameter values needed in your simulation suitably.

4. Consider the Dataset `https://storage.googleapis.com/download.tensorflow.org/data/iris_training.csv`. This specific dataset separates flowers into three different classes of species; Setosa, Versicolor, and Virginica. The information about each flower contains Sepal length, Sepal width, petal length, and petal width. Taking only Petal length and Petal width as attributes, build the SLIQ classifier and train it on the above dataset.

5. Test the above classifier on the dataset `https://storage.googleapis.com/download.tensorflow.org/data/iris_test.csv`. Compute the classifier accuracy.