ECE 50863
Reading Assignment Related to Project 3

Name:

Collaborator (if any) – see instructions:

Instructions:

1) All questions pertain to the paper: "A Control-Theoretic Approach for Dynamic Adaptive Video Streaming over HTTP", Sigcomm 2015
2) Answers must be neatly typed. You may use additional space than what's provided in this document, but you probably don't want to exceed 3-4 lines for any question.
3) Although the assignment will be a small portion of the credit for the Project, it is important to do it carefully as it will impact your implementation, and there will be detailed questions in the Final Exam.
4) You may collaborate with one other student. Collaboration should be restricted to discussing the paper/joint reading sessions, and brainstorming about the questions below. The answers that each of you write must be individual and using your own words. Also, if you collaborated, mention who you collaborated with above.

Questions:

1) What are the key factors that constitute the Quality of Experience (QoE) of a video session?

2) As per the paper, what are the two categories of existing solutions for video streaming? Why do they fall short?

3) At each step, the algorithm solves an optimization problem shown in Figure 3. What are the variables that it is trying to determine? What is the objective?

4) The optimization in Figure 3 needs C_t, a prediction of future throughput at time t. What prediction method did the authors use in this paper? [Hint: end of Sec 6, and 7.1.2]

5) What are the main reasons the authors chose a Model Predictive Control approach?

6) What is RobustMPC? What is the disadvantage of RobustMPC? What is the advantage of RobustMPC?

7) Based on the evaluation section (7.1.2), what is the main difference between the FastMPC algorithm and the RobustMPC algorithm? [Note: don't worry about the techniques for computation efficiency for FastMPC described earlier in the paper for this question].

8) In the evaluations, what is the QoE metric normalized to for each algorithm?

9) In the evaluations, what tools are used to emulate different network conditions?

10) The authors use three sets of throughput traces. What are the key differences in characteristics of these three traces, that may impact a relative comparison of different algorithms?

11) How the FastMPC and RobustMPC algorithms compare across the three traces for the Normalized QoE metric? Is one always better? If so, why? If not, which performs better for which trace, and why?

12) In Figure 8, the authors present the QoE metric, while in Figure 10, the authors present results with many individual metrics (average bitrate, rebuffer time, and bitrate change). How does the RobustMPC algorithm perform relative to other algorithms in these individual metrics? How does it perform relative to other algorithms on the normalized QoE metric?

13) Open-ended: Based on the paper, do you have any thoughts on a better algorithm that you could design? Or any thoughts on a potential problem that the proposed MPC approach may encounter? [Not more than 4-5 lines].