LBP: Robust Rate Adaptation Algorithm for SVC Video Streaming

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Abstract—Video streaming today accounts for up to 55% of mobile traffic. In this paper, we explore streaming videos encoded using scalable video coding (SVC) scheme over highly variable bandwidth conditions, such as cellular networks. SVC's unique encoding scheme allows the quality of a video chunk to change incrementally, making it more flexible and adaptive to challenging network conditions compared to other encoding schemes. Our contribution is threefold. First, we formulate the quality decisions of video chunks constrained by the available bandwidth, the playback buffer, and the chunk deadlines as an optimization problem. The objective is to optimize a novel quality-of-experience metric that models a combination of the three objectives of minimizing the stall/skip duration of the video, maximizing the playback quality of every chunk, and minimizing the number of quality switches. Second, we develop layered bin packing (LBP) adaptation algorithm, a novel algorithm that solves the proposed optimization problem. Moreover, we show that LBP achieves the optimal solution of the proposed opti-mization problem with linear complexity in the number of video
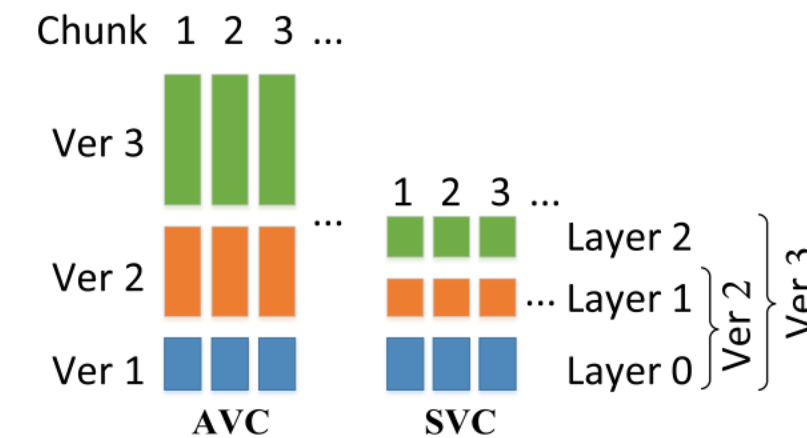

Fig. 1. AVC vs SVC Encoding.

popularity is on the rise, delivering high quality streaming video over cellular networks remains extremely challenging. In particular, the video quality under challenging conditions such as mobility and poor wireless channel is sometimes unacceptably poor. Almost every viewer at some point in time can relate to experiences of choppy videos, stalls, *etc*.

Not surprisingly, a lot of attention from both research and