

RECOMMENDATION ITU-R BT.1789

A method to reconstruct received video using transmission error information for packet video transmission

(Questions ITU-R 44/6 and ITU-R 109/6)

(2007)

Scope

This Recommendation specifies a method for a service provider to reconstruct received video in order to monitor video quality at a receiver using transmission error information for packet video transmission. This Recommendation applies to video services where two-way digital communications are available.

The ITU Radiocommunication Assembly,

considering

- a) that the traditional evaluation of video quality has been performed subjectively by a number of evaluators;
- b) that, although the subjective test is considered to be the most accurate method, it has many limitations since it is time-consuming and expensive;
- c) that it is desirable that the service provider monitors video quality at the receiver;
- d) that some objective methods for video quality measurement require additional bandwidth for transmitting parameters;
- e) that bandwidth is a valuable and expensive resource in many multimedia services;
- f) that the communication paths of most multimedia applications will be completely digital;
- g) that transmission errors and their effects on received video are readily identified when video data is transmitted in packets;
- h) that a certain type of receiver is able to detect the occurrence of transmission errors;
- j) that the receiver is able to send such transmission error information to the head-end¹ in some multimedia applications with return channel capability,

noting

- a) that it is possible for the head-end to efficiently monitor the received video quality by using the reconstructed video sequence, together with other available information including the source sequence for the packet video transmission,

recommends

- 1** that the method described in Annex 1 should be used for the head-end to reconstruct the video seen at any receiver, in order to monitor the video quality at that receiver.

¹ The head-end includes a transmitter, a received video estimation unit and a video quality estimation unit, in accordance with Recommendation ITU-R BT.1683. It may also include an encoder.

Annex 1

1 Introduction

Objective video quality measurement methods are classified into three categories: full-reference (FR) models, reduced-reference (RR) models, and no-reference models. Generally, the accuracy of no-reference models is inferior to that of the FR and RR models. Figure 1 shows a block diagram of full-reference models and Fig. 2 shows a block-diagram of reduced-reference models. The full-reference model, which takes two input video sequences (source video sequence and processed video sequence), produces a video quality metric (VQM) of the processed video sequence.

As can be seen, both the FR and RR models require source video and processed video sequences for video quality assessment. On the other hand, for some broadcasting services, monitoring of received video quality is important. If a FR model is to be used, the source video sequence should be available at the receiver (Fig. 3) or the processed video sequence (impaired video) should be available at the head-end (Fig. 4). According to this Recommendation, the received video quality, as seen at the receiver, may be evaluated at the head-end. This requires the source video sequence, or features extracted from the source video sequence, to be available to the head-end. If an RR model is to be used, the features extracted from the source video sequence are required to be available at the receiver (Fig. 5) or the features extracted from the processed video sequence (impaired video) are required to be available at the head-end (Fig. 6). Since bandwidth is a valuable and expensive resource in many multimedia applications, it is desirable to avoid transmission of this additional data.

FIGURE 1

A full-reference model

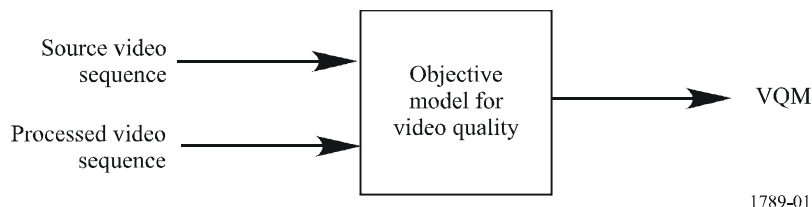


FIGURE 2

A reduced-reference model

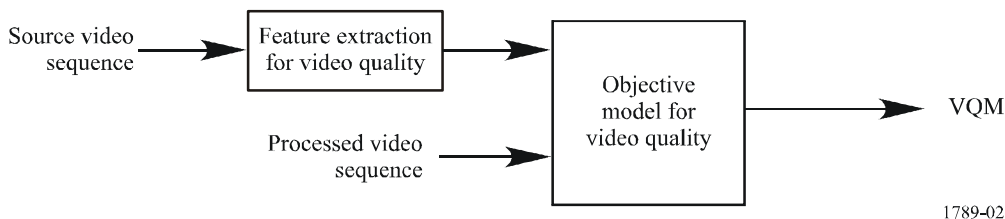


FIGURE 3

A block diagram for the receiver computing the video quality of the received video using an FR model

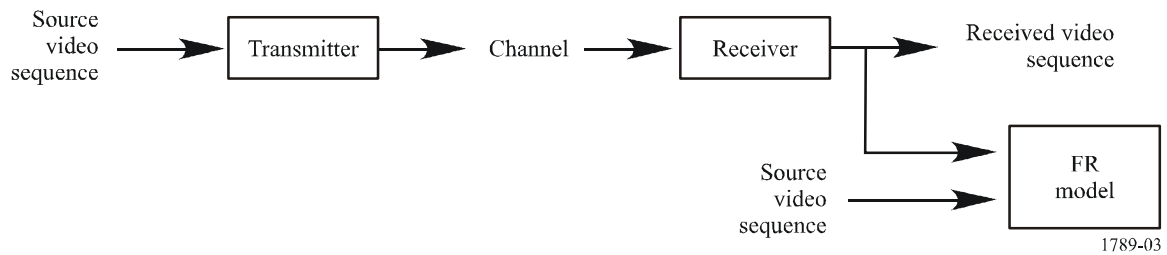


FIGURE 4

A block diagram for the head-end computing the video quality of the received video using an FR model

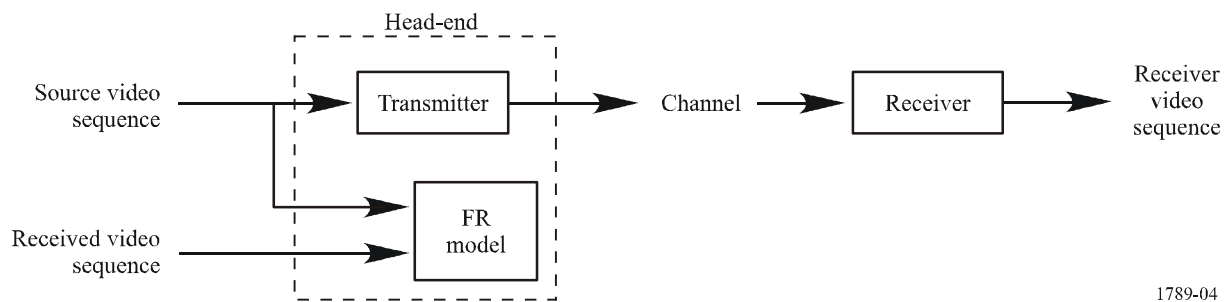


FIGURE 5

A block diagram for the receiver computing the video quality of the received video using an RR model

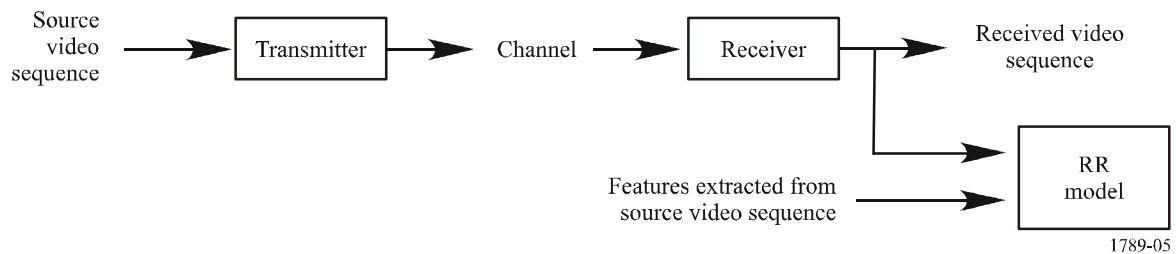


FIGURE 6

A block diagram for the head-end computing the video quality of the received video using an RR model

