Claims

1. A video quality estimation method, comprising the steps of:
   - receiving a video bitstream comprising a series of picture frames;
   - determining an error occurrence in a partition of a picture frame;
   - keeping track of at least one of a temporal propagation and a spatial propagation of the error by using at least one of motion vector information and intra prediction that relates to the error-affected partition; ~~and~~
   - estimating a quality of the video bitstream based on the error propagation;
   - determining a visual degradation caused by the error; and
   - aggregating the visual degradation caused by the error over at least one of time and space, wherein aggregating the visual degradation comprises weighting the visual degradation at a higher factor for small visual degradation than for large visual degradation.

2. The method according to claim 1, ~~further comprising~~ wherein the step of determining a visual degradation caused by the error is by calculating a penalty value for each error-affected partition or picture frame, said penalty value being indicative of the amount of visual degradation caused by the error.

3. The method according to claim 2, wherein the penalty value is calculated according to one or more of the following rules:
   - assigning a higher penalty value to the error if the error occurs in a scene change;
   - assigning a higher penalty value to the error if the video bitstream comprises motion data directly after an error-affected picture frame and particularly if a relative magnitude of the motion is large;
   - assigning no penalty value to the error for the error-affected partition if the partition is a skip or is an estimated skip, optionally unless there is a scene change or an estimated scene change;
   - decreasing the penalty value assigned to the error for at least one subsequent picture frame by a predetermined amount or factor; and

- resetting the penalty value upon reception of an intra-coded partition or an intra-coded picture frame.

4. The method according to claim 2 or 3, further comprising the step of:
   - collecting the visual degradation in a loss penalty map, wherein the loss penalty map optionally has the same resolution as the associated picture or a lower resolution than the picture.

5. The method according to any one of the claims 2 to 4, wherein determining at least one of the temporal propagation and the spatial propagation of the error comprises weighting the visual degradation for a previous error.

6. The method according to any one of the claims 2 to 5, further comprising the step of:
   ~~- aggregating the visual degradation caused by the error over at least one of time and space; and~~
   - based on result of the aggregation, calculating a score indicative of the quality of the video bitstream.

~~7. The method according to claim 6, wherein aggregating the visual degradation comprises weighting the visual degradation at a higher factor for small visual degradation than for large visual degradation.~~

~~8.~~7. The method according to ~~any one of~~ claim~~s~~ 6 ~~to 7~~, wherein the score is calculated periodically or using a sliding window approach where a new score for a predefined time duration is calculated at a predefined rate.

~~9.~~8. The method according to any one of the previous claims, wherein the video bitstream comprises at least a portion of a video coding layer, wherein the video coding layer comprises one or more parameters, and wherein at least one of the steps of determining the error occurrence, determining the error propagation, and estimating the video quality is based on at least one or more of the parameters.

~~10.~~9. A computer program for video quality estimation, comprising program code portions which when run on a computer cause the computer to perform the steps of any one of the previous claims.

~~11.~~10. A device for estimating video quality, the device comprising:

- a receiver adapted to receive a video bitstream comprising a series of picture frames;
- a first determinator adapted to determine an error occurrence in a partition of a picture frame;
- a second determinator adapted to keep track of at least one of a temporal propagation and a spatial propagation of the error by using at least one of motion vector information and intra prediction that relates to the error-affected partition; ~~and~~
- an estimator adapted to estimate a quality of the video bitstream based on the error propagation;
- a third determinator adapted to determine visual degradation caused by the error; and
- an aggregator adapted to aggregate the visual degradation caused by the error over at least one of time and space, wherein the aggregator aggregates the visual degradation by weighting the visual degradation at a higher factor for small visual degradation than for large visual degradation.

~~12.~~11. The device according to claim 10~~1~~, ~~further comprising:~~wherein the ~~a~~ third determinator is adapted to determine visual degradation caused by the error by calculating a penalty value for each error-affected partition or picture frame, said penalty value being indicative of the amount of visual degradation caused by the error.

~~13.~~12. The device according to claim 11~~2~~, wherein the third determinator is further adapted to calculate the penalty value according to one or more of the following rules:

- assign a higher penalty value to the error if the error occurs in a scene change;
- assign a higher penalty value to the error if the video bitstream comprises motion data directly after the error-affected picture frame and particularly if a relative magnitude of the motion is large;
- assign no penalty value to the error for the error-affected partition if the partition is a skip or is an estimated skip, optionally unless there is a scene change or an estimated scene change;

- decrease the penalty value assigned to the error for at least one of the subsequent picture frames by a predetermined amount or factor; and
- reset the penalty value upon reception of an intra-coded picture frame or intra-coded partition.

~~14.~~13. The device according to any one of the claims 1~~0~~1 to 1~~2~~3, further comprising:

- a collector adapted to collect the visual degradation in a loss penalty map.

~~15.~~14. The device according to any one of the claims 1~~0~~1 to 1~~3~~4, further comprising:

~~- an aggregator adapted to aggregate the visual degradation caused by the error over at least one of time and space; and~~

- a calculator adapted to calculate a score indicative of the quality of the video bitstream based on result of the aggregation.

~~16.~~15. A server node for providing a video bitstream, the server node comprising the device according to any one of the claims 1~~0~~1 to 1~~4~~5.

~~17.~~16. A client terminal for decoding a video bitstream, the client terminal comprising the device according to any one of the claims 1~~0~~1 to 1~~4~~5.

~~18.~~17. A network node for communication between a video server node and a video client terminal, the network node comprising the device according to any one of the claims 1~~0~~1 to 1~~4~~5.