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Direct measurement of digital television signal quality

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ABSTRACT

This disclosure describes techniques to measure the quality of digital TV signals. Publicly available television broadcasts are received using high-quality reception equipment to obtain an error free training set. Transmission errors such as signal corruption and packet loss are simulated by injecting common faults into the error free training set to generate faulty signal training data sets. A machine learning model is trained using a combination of error-free and faulty digital TV signal training data sets. The trained machine learning model is used to measure signal quality of an MPEG transport stream of a digital TV signal and generate a metric indicative of signal quality.

KEYWORDS

- Digital television
- MPEG transport stream
- Television broadcast
- Transmission errors
- Signal quality

BACKGROUND

Television ("TV") signal measurement is important for monitoring the quality of service to users of digital TV signal networks. Digital TV is susceptible to interference that overpowers the desired signal and can render the signal too weak to decode reliably. Under weak signal conditions, some receiving equipment might show a garbled picture, while other equipment may display no video at all. However, existing methods for measuring the quality of digital TV signals are complex and cumbersome.

DESCRIPTION

Techniques described herein can be utilized to evaluate the quality of digital TV signals using machine learning. The techniques described are utilized to perform a direct measurement of the transport data stream and can be utilized for any system that transmits, receives and/or processes digital TV signals.

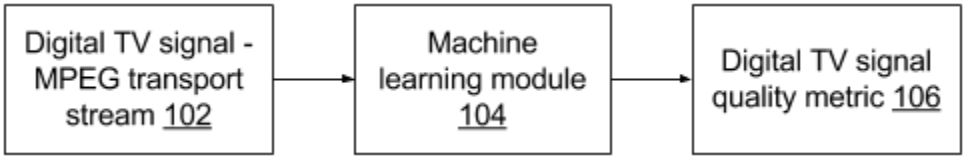

Fig. 1: Measurement digital TV signal quality

Fig. 1 illustrates a machine learning module (104) that takes the MPEG transport stream of a digital TV signal (102) as input and generates a quality metric (108) for the signal. The machine learning model is trained with existing TV data to predict the quality of TV signals.

Publicly available television broadcasts are received using high-quality reception equipment to create an error free training set. Additional training data is generated by injecting error signals that simulate various transmission errors into the error free data.

For example, typical transmission errors such as packet loss and signal corruption are simulated and injected as faults into the training data sets. The machine learning module is trained using a combination of error-free and faulty digital TV signal training data sets.

The described techniques are simple, easy to implement and applicable to any digital TV signal regardless of its format. The machine learning module is trained with real-world data, e.g., previously broadcast TV signals. Consequently, the evaluation of the quality of digital TV signals is robust to variations in signal transmissions caused by broadcasters that may diverge from the specification.

CONCLUSION

This disclosure describes techniques to measure the quality of digital TV signals. Publicly available television broadcasts are received using high-quality reception equipment to obtain an error free training set. Transmission errors such as signal corruption and packet loss are simulated by injecting common faults into the error free training set to generate faulty signal training data sets. A machine learning model is trained using a combination of error-free and faulty digital TV signal training data sets. The trained machine learning model is used to measure signal quality of an MPEG transport stream of a digital TV signal and generate a metric indicative of signal quality. The evaluation of the quality of digital TV signals is robust to variations in signal transmissions caused by broadcasters that may diverge from the specification.