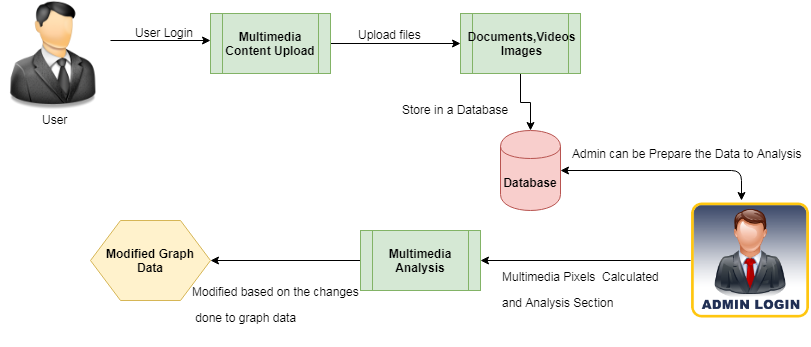
**TOWARD BETTER STATISTICAL VALIDATION OF MACHINE LEARNING-BASED MULTIMEDIA QUALITY ESTIMATORS**

**ABSTRACT:**

Objective assessment of multimedia quality using machine learning (ML) has been gaining popularity especially in the context of both traditional (e.g., terrestrial and satellite broadcast) and advance (such as over-the-top media services, IPTV) broadcast services. Being data-driven, these methods obviously rely on training to find the optimal model parameters. Therefore, to statistically compare and validate such ML-based quality predictors, the current approach randomly splits the given data into training and test sets and obtains a performance measure (for instance mean squared error, correlation coefficient etc.). The process is repeated a large number of times and parametric tests (e.g., t test) are then employed to statistically compare mean (or median) prediction accuracies. However, the current approach suffers from a few limitations (related to the qualitative aspects of training and testing data, the use of improper sample size for statistical testing, possibly dependent sample observations, and a lack of focus on quantifying the learning ability of the ML-based objective quality predictor) which have not been addressed in literature. Therefore, the main goal of this paper is to shed light on the said limitations both from practical and theoretical perspectives wherever applicable, and in the process propose an alternate approach to overcome some of them. As a major advantage, the proposed guidelines not only help in a theoretically more grounded statistical comparison but also provide useful insights into how well the ML-based objective quality predictors exploit data structure for learning. We demonstrate the added value of the proposed set of guidelines on standard datasets by comparing the performance of few existing ML-based quality estimators. A software implementation of the presented guidelines is also made publicly available to enable researchers and developers to test and compare different models in a repeatable manner.

**ARCHITECTURE:**



**EXISTING SYSTEM:**

The use of ML for objective quality estimation is particularly suitable for broadcast applications where the quality of the received or transmitted content needs to be assessed objectively based on limited signal information. Not surprisingly, ML has been exploited in the past for the said purpose. Some existing techniques presented one of the first comprehensive methods for estimating quality of MPEG video streams, and are based on circular back propagation neural networks. A no reference method was presented, which is based on mapping frame-level features into a spatial quality score followed by temporal pooling. The method developed in is based on features extracted from the analysis of discrete cosine transform (DCT) coefficients of each decoded frame in a video sequence, and subsequent quality prediction using a neural network. Another ML based video quality estimator was presented in where symbolic regression-based frame work was trained on a set of features extracted from the received video bit stream. The ML based quality estimator proposed in works on the similar principle of analyzing several features such as distinguishing the type of codec used (MPEG or H.264/AVC), DCT coefficients, estimation of the level of quantization used in the I-frames, etc. The next step is to apply support vector regression to predict video quality. The objective quality estimator proposed in was based on polynomial regression model, where the independent variables (or features) were based on spatial and temporal quantities derived from video spatiotemporal complexity, bitrate, and packet loss measurements. Existing works employed deep learning (deep belief networks) and bit stream specific features to predict quality objectively in a video transmission network. Deep learning has also been employed for quality measurement in live video streaming. Moreover, promising results from related disciplines such as computer vision and the availability of required hardware (e.g., GPU-accelerated computing) have opened up possibilities of developing efficient ML based implementations of quality predictors.

**PROPOSED SYSTEM:**

As far as the statistical comparison and validation of ML based quality predictors is concerned, the current approach is based on repeated and random splits of data (i.e., predictions from ML based methods and the corresponding subjective scores for the given multimedia content) into training and test sets. In each iteration, a performance measure (like mean squared error, correlation coefficient etc.) is obtained. Then, the means (or in some cases median) of such repeated performance measure for each ML based estimator are statistically compared via pairwise t. However, because of the requirement of training the current approach needs to be examined more closely in terms of the factors that can affect the validation process. These include qualitative aspects of training and testing data, determining the appropriate sample size when splitting the given data into training and test sets, the issue of possibly dependent sample observations and the analysis pertinent to the learning ability of the method (note that these issues are not relevant in case of statistical comparison of non-ML based predictors because there is no training involved and hence a question of train-test split typically does not arise). A survey of literature (e.g., refer to for some existing efforts in ML based quality estimation for video or for standardized recommendations) reveals that these important issues have not been thoroughly examined (either from theoretical or practical view points) although few works such as have considered the practical implications of the first issue regarding the qualitative aspects of training and testing data (also refer to some related works on statistical comparison of classifiers or analysis of their learning ability). Therefore, the main aim of the paper is to shed light on these factors, and in the process present a set of new guidelines to overcome the drawbacks of the current approach. The proposed guidelines offer the advantage of focusing on practical use-case scenario and quantifying the learning ability of the ML based quality estimator. Therefore, the use of these guidelines helps to make more informed conclusions and recommendations about metric performance. In contrast, the existing approach tends to treat ML based methods as black boxes and focuses primarily on global, binary decisions about metric performance. Software implementing the presented guidelines is also made publicly available, 1 in order to achieve the goal of reproducible research.

**ALGORITHM:**

**Linear Regression:**

In statistics, linear regression is a linear approach to modeling the relationship between a scalar response (and dependent variable) and one or more explanatory variables (or independent variables). The case of one explanatory variable is called simple linear regression. For more than one explanatory variable, the process is called multiple linear regressions. This term is distinct from multivariate linear regression, where multiple correlated dependent variables are predicted, rather than a single scalar variable. Linear regression was the first type of regression analysis to be studied rigorously, and to be used extensively in practical applications. This is because models which depend linearly on their unknown parameters are easier to fit than models which are non-linearly related to their parameters and because the statistical properties of the resulting estimators are easier to determine.

**MODULES:**

1. **Data Upload**
2. **Multimedia Analysis**
3. **Graph Analysis**
4. **OTP request**
5. **DATA UPLOAD**

The process is initiated in this step and data can be uploaded from the user and admin can be prepare the data to analysis the particular multimedia content is good or not. The multimedia data can be any form of image or so. The data can be stored in the database with the details are given. The main upload part is done with the given folder in django framework. The python frame work allows user to store data.

1. **MULTIMEDIA ANALYSIS**

The Uploaded data then process to this level of project, once user is enter into the data, multimedia pixels were calculated. The pixels are then compared with the given trained data of admin. Admin can train the data with particular amount of data and have set the bench mark for the quality of the content in multimedia.

1. **GRAPH ANALYSIS**

The data can be given to graph in order to analysis. The graph may be varying to analysis particular data. The Pie, bar or line chart are more convenient to do this. The graph data are taken from the analysis section of the process and it can be modified based on the changes done to graph data.

1. **OTP Request**

A **one-time password** (**OTP**), also known as **one-time pin**, is a password that is valid for only one login session or transaction, on a computer system or other digital device. OTPs avoid a number of shortcomings that are associated with traditional (static) password-based authentication; a number of implementations also incorporate two factor authentication by ensuring that the one-time password requires access to *something a person has* (such as a small keyring fob device with the OTP calculator built into it, or a smartcard or specific cellphone) as well as something a person knows (such as a PIN).

The most important advantage that is addressed by OTPs is that, in contrast to static [passwords](https://en.wikipedia.org/wiki/Password), they are not vulnerable to [replay attacks](https://en.wikipedia.org/wiki/Replay_attack). This means that a potential intruder who manages to record an OTP that was already used to log into a service or to conduct a transaction will not be able to abuse it, since it will no longer be valid. A second major advantage is that a user who uses the same (or similar) password for multiple systems, is not made vulnerable on all of them, if the password for one of these is gained by an attacker

**REQUIREMENT ANALYSIS**

The project involved analyzing the design of few applications so as to make the application more users friendly. To do so, it was really important to keep the navigations from one screen to the other well ordered and at the same time reducing the amount of typing the user needs to do. In order to make the application more accessible, the browser version had to be chosen so that it is compatible with most of the Browsers.

**REQUIREMENT SPECIFICATION**

**Functional Requirements**

* Graphical User interface with the User.

**Software Requirements**

For developing the application the following are the Software Requirements:

1. Python
2. Django
3. MySql
4. MySqlclient
5. WampServer 2.4

**Operating Systems supported**

1. Windows 7
2. Windows XP
3. Windows 8

**Technologies and Languages used to Develop**

1. Python

**Debugger and Emulator**

* Any Browser (Particularly Chrome)

**Hardware Requirements**

For developing the application the following are the Hardware Requirements:

* Processor: Pentium IV or higher
* RAM: 256 MB
* Space on Hard Disk: minimum 512MB

**CONCLUSION:**

With the growing demands for more immersive quality of experience from consumers, quality monitoring in multimedia content delivery especially via broadcast services assumes a significant role in today’s scenario. To that end, ML based quality predictors offer a plausible solution. Moreover, promising results from related disciplines such as computer vision and the availability of required hardware (e.g., GPU-accelerated computing) have opened up possibilities of developing efficient ML based implementations of quality predictors. However, proper validation and benchmarking of such ML based quality estimators is important prior to deployment. In that context, the main goal of the paper was to highlight few drawbacks associated with the current approach of statistical comparison and validation. These stem primarily from lack of considerations to theoretical and practical aspects of statistical testing. Therefore, the main goal of the paper was to raise awareness about some of the identified issues in the current approach. We also provided theoretical analysis concerning dependent (correlated) sample observations. Further, we discussed several other limitations related to sample size, the lack of assessment of the magnitude of treatment effect and an almost exclusive reliance on p values to compare ML based quality predictors. We also argued that assessment of learning ability is an important aspect to validate such learning based predictors, and discussed the use of a permutation test to that end.

**FUTURE WORK:**

Essentially, the proposed guidelines treat statistical comparison of ML based quality estimators as a multi-dimensional problem. Accordingly, we seek to assess the predictors more holistically in terms of their local performance on specific test conditions, their learning ability and the magnitude of treatment effect (in order to quantify the practical significance of the observed differences). In contrast, the current approach tends to reduce this task to binary and global statistical decision making, and does not reveal systematic weaknesses (or strengths) of the predictors. In order to provide a tool for practical use, software implementing the proposed guidelines is made publicly available.