

# High-Quality Jpeg Compression using LDN Comparison and Quantization Noise Analysis

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**Abstract**— To identify whether an image has been JPEG compressed is an important issue in forensic practice.. In this paper, we provide a novel quantization noise-based solution to reveal the traces of JPEG compression with preprocessing system for extracting LDN (local directional number pattern) before compression& during decompression LDN get compared. What LDN does is generates 6 digit binary code for each pixel and stores separately during compression. LDN value of image before compression and after compression is compared to get significant result. We analytically derive that a decompressed JPEG image has a lower variance of forward quantization noise than its uncompressed counterpart. With the conclusion, we develop a simple yet very effective detection algorithm to identify decompressed JPEG images. We also demonstrate that the proposed method is robust to small image size and chroma sub sampling. The proposed algorithm can be applied in some practical applications, such as Internet image classification and forgery detection.

**Key words:** LDN (Local Directional Number Pattern ); JPEG image compression; Forward Quantization Noise; Decompressed JPEG images

## I. INTRODUCTION

Image processing is an important component of modern technologies because human depends so much on the visual information than other creatures. Image is better than any other information form for us to perceive. Among our information about the world, 99% is perceived with our eyes. Image processing has traditionally been an area in the engineering community. The basic tools are Fourier analysis with a long history and wavelet analysis which has become popular in the engineering community since 1980's. In the past few decades several advanced mathematical approaches has been introduced into this field, namely, the variation calculus, partial differential equations (PDE) and stochastic approaches (or) statistical methods, and they have become important tools for theoretical image processing.

### A. Objective of The Project:

The main objective of our project is to compress the jpeg image for security purpose.

- 1) LDN Generation 6digit binary value for each pixel.
- 2) Image Classification Algorithm: We first convert color images into gray-scale images
- 3) Histogram generation for jpeg image.
- 4) These steps are followed during image compression and decompression with same technique

## II. EXISTING SYSTEM

- One of the weaknesses of all encryption systems is that the form of the output data (the cipher text), if

intercepted, alerts the intruder to the fact that the information being transmitted may have some importance and that it is therefore worth attacking and attempting to decrypt it. This aspect of cipher text transmission can be used to propagate disinformation, achieved by encrypting information that is specifically designed to be intercepted and decrypted. In this case, system assume that the intercept will be attacked, decrypted and the information retrieved.

- The 'key' to this approach is to make sure that the cipher text is relatively strong and that the information extracted is of good quality in terms of providing the attacker with 'intelligence' that is perceived to be valuable and compatible with their expectations, i.e. information that reflects the concerns/ interests of the individual and/or organization that Encrypted the data.
- This approach provides the interceptor with a 'honey pot' designed to maximize their confidence especially when they have had to put a significant amount of Work in to 'extracting it'. The trick is to make sure that this process is not too hard or too easy. 'Too hard' will defeat the object of the exercise as the attacker might give up; 'too easy', and the attacker will suspect a set-up.

### A. Limitations of Existing System:

- This system allows limited participation to avoid traffic flow and from attack
- During image decompression noise occurs and quality loss.

### B. Proposed System:

- We also demonstrate that the proposed method is robust to small image size and chroma sub sampling. The proposed algorithm can be applied in some practical applications, such as Internet image classification and forgery detection. In this paper, we propose a method to reveal the traces of JPEG compression.
- The proposed method is based on analyzing the forward quantization noise; the main contribution of this work is to address the challenges posed by high-quality compression in JPEG compression identification by generating and matching LDN values, histogram, Image Classification Algorithm.

### C. Advantages:

- Highly secure no intrusion can be done
- Image quality loss doesn't happen.

## III. FEASIBILITY STUDY

The feasibility of the project is analyzed in this phase and business proposal is put forth with a very general plan for the project and some cost estimates. During system analysis the feasibility study of the proposed system is to be carried out.

This is to ensure that the proposed system is not a burden to the company. For feasibility analysis, some understanding of the major requirements for the system is essential. Three key considerations involved in the feasibility analysis are

- Economical Feasibility
- Technical Feasibility
- Social Feasibility

#### A. Economical Feasibility:

This study is carried out to check the economic impact that the system will have on the organization. The amount of fund that the company can pour into the research and development of the system is limited. The expenditures must be justified. Thus the developed system as well within the budget and this was achieved because most of the technologies used are freely available. Only the customized products had to be purchased.

#### B. Technical Feasibility:

This study is carried out to check the technical feasibility, that is, the technical requirements of the system. Any system developed must not have a high demand on the available technical resources. This will lead to high demands on the available technical resources. This will lead to high demands being placed on the client. The developed system must have a modest requirement; as only minimal or null changes are required for implementing this system.

#### C. Social Feasibility:

The aspect of study is to check the level of acceptance of the system by the user. This includes the process of training the user to use the system efficiently. The user must not feel threatened by the system, instead must accept it as a necessity. The level of acceptance by the users solely depends on the methods that are employed to educate the user about the system and to make him familiar with it. His level of confidence must be raised so that he is also able to make some constructive criticism, which is welcomed, as he is the final user of the system.

### IV. MODULE DESCRIPTION

- Implementation is the stage of the project when the theoretical design is turned out into a working system. Thus it can be considered to be the most critical stage in achieving a successful new system and in giving the user, confidence that the new system will work and be effective.
- The implementation stage involves careful planning, investigation of the existing system and its constraints on implementation, designing of methods to achieve changeover and evaluation of changeover methods.

#### A. List of Modules:

- Image Indexing.
- LDN Generation.
- Histogram Generation.
- Image Compression/decompression.

#### B. Image Indexing:

In this module, the administrator will index the image and provide the necessary details once image are indexed in the image dataset folder. Image stored in the data set folder are

pre-processed, divided into blocks and saved. We extract the entire feature automatically and the features are stored separately according to which LDN code is generated. LDN Code is in binary format which is saved in separate folder during the comparison it will be used to verify the image.

#### C. LDN Generation:

The proposed Local Directional Number Pattern (LDN) is a six-bit binary code assigned to each pixel of an input image that represents the structure of the texture and its intensity transitions. The positive and negative responses provide valuable information of the structure of the neighborhood, as they reveal the gradient direction of bright and dark areas in the neighborhood. Thereby, this distinction, between dark and bright responses, allows LDN to differentiate between blocks with the positive and the negative direction swapped (which is equivalent to swap the bright and the dark areas of the neighborhood, by generating a different code for each instance, while other methods may mistake the swapped regions as one. Furthermore, these transitions occur often in the face, for example, the top and bottom edges of the eyebrows and mouth have different intensity transitions. Thus, it is important to differentiate among them; LDN can accomplish this task as it

#### D. Histogram Generation:

In this module, the histogram is generated based on the query image selected from the image dataset. The horizontal axis of the graph represents the tonal variations, while the vertical axis represents the number of pixels in that particular tone. The left side of the horizontal axis represents the black and dark areas, the middle represents medium grey and the right hand side represents light and pure white areas. The vertical axis represents the size of the area that is captured in each one of these zones. Thus, the histogram for a very dark image will have the majority of its data points on the left side and center of the graph. Conversely, the histogram for a very bright image with few dark areas and/or shadows will have most of its data points on the right side and center of the graph.

#### E. Image Compression/Decompression:

Image compression and decompression done at this module. Sender registers and sends image in compressed format receiver it will be decompressed and noise filtering is done during the image decompression stage. For noise filtering is done during quantization noise analysis.

V. SYSTEM DESIGN:

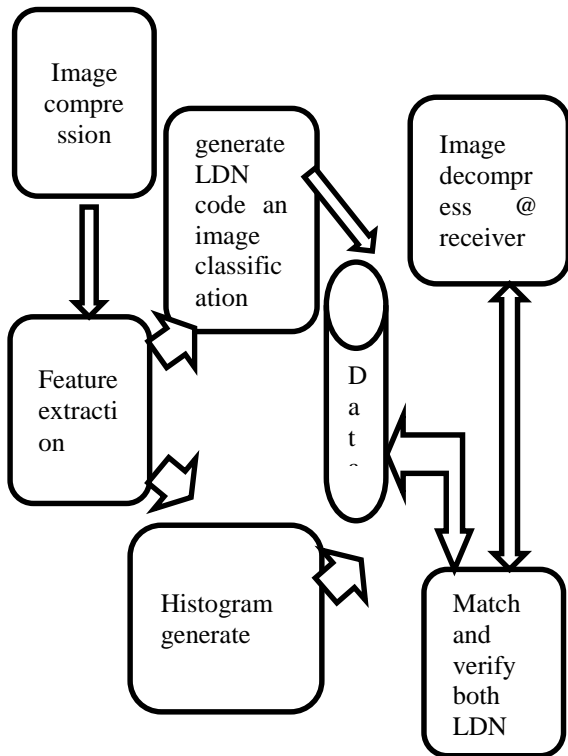


Fig. 5.1: System architecture

We extract the entire feature automatically and the features are stored separately according to which LDN code is generated. LDN Code is in binary format which is saved in separate folder during the comparison it will be used to verify the image. The histogram is generated based on the query image selected from the image dataset. The horizontal axis of the graph represents the tonal variations, while the vertical axis represents the number of pixels in that particular tone. The left side of the horizontal axis represents the black and dark areas, the middle represents medium grey and the right hand side represents light and pure white areas. The vertical axis represents the size of the area that is captured in each one of these zones. Thus, the histogram for a very dark image will have the majority of its data points on the left side and center of the graph. Conversely, the histogram for a very bright image with few dark areas and/or shadows will have most of its data points on the right side and center of the graph. In this module, we compare the images based on the LDN code and features of the image whenever Image decompress.

A. Input Design

- Input Design is the process of converting a user-oriented description of the input into a computer-based system. This design is important to avoid errors in the data input process and show the correct direction to the management for getting correct information from the computerized system.
- It is achieved by creating user-friendly screens for the data entry to handle large volume of data. The goal of designing input is to make data entry easier and to be free from errors. The data entry screen is designed in such a way that all the data manipulates can be performed. It also provides record viewing facilities.

- When the data is entered it will check for its validity. Data can be entered with the help of screens. Appropriate messages are provided as when needed so that the user will not be in maize of instant. Thus the objective of input design is to create an input layout that is easy to follow.

B. Output Design:

- A quality output is one, which meets the requirements of the end user and presents the information clearly. In any system results of processing are communicated to the users and to other system through outputs. In output design it is determined how the information is to be displaced for immediate need and also the hard copy output. It is the most important and direct source information to the user. Efficient and intelligent output design improves the system's relationship to help user decision-making.
- Designing computer output should proceed in an organized, well thought out manner; the right output must be developed while ensuring that each output element is designed so that people will find the system can use easily and effectively. When analysis design computer output, they should Identify the specific output that is needed to meet the requirements.
- Select methods for presenting information. Create document, report, or other formats that contain information produced by the system.
- The output form of an information system should accomplish one or more of the following objectives.
  - Convey information about past activities, current status or projections of the Future.
  - Signal important events, opportunities, problems, or warnings.
  - Trigger an action.
  - Confirm an action

C. Dataflow Diagram:

- The Data Flow Diagram is one of the most improvement tools used by the system analyst DeMacro (1978) Nad Gand Sarson (1979) popularized the use of the data flow diagram as modeling tools through their structured system analysis methodologies.
- A Data Flow Diagram should be the first tool used by the system analyst to model system components. These components represent the system processes, the data used by this processes and external entities that interact with the system and the information flows in the system.
- A Data Flow Diagram is a graphical representation of the "flow" of data through an information system, modeling its process aspects. Often they are a preliminary step used to create an overview of the system which can later be elaborated. DFDs can also be used for the visualization of data processing.

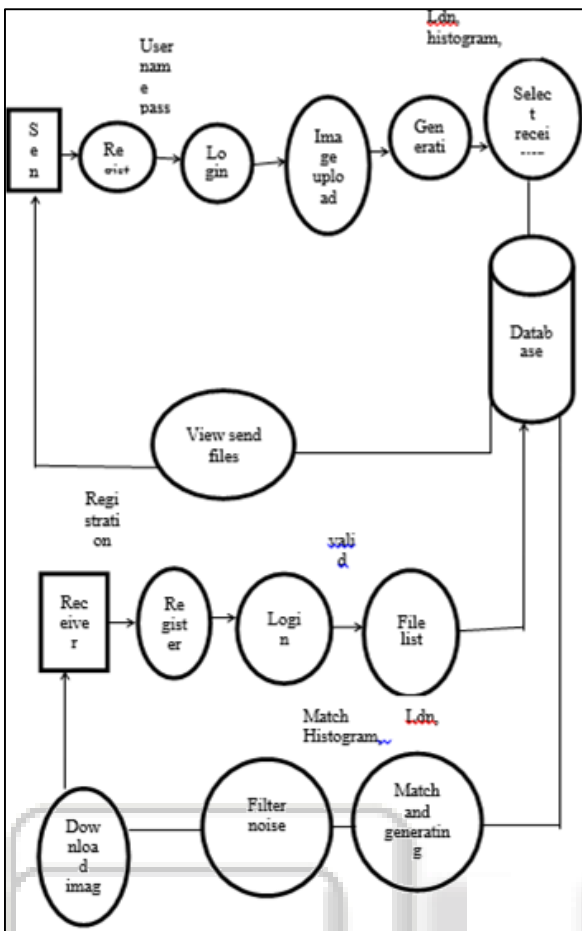


Fig. 5.2: Dataflow diagram

## VI. IMPLEMENTATION

- Implementation is the most crucial stage in achieving a successful system and giving the user's confidence that the new system is workable and effective. Implementation of modified application to replace an existing one. This type of conversation is relatively easy to handle, provide there are no major charges in the system.
- Each program is tested individually at the time of development using the data and has verified that this program linked together in the way specified in the programs specification, the computer system and its environment is tested to the satisfaction of the user.
- The system that has been developed is accepted proved to be satisfactory for the user. And so the system is going to be implemented very soon. A simple operating procedure in included so that the user can understand the different function quickly.
- Initially as a first step the executable from of the application is to be created and loaded in the common server machine which is accessible to all users and the server is to be connected to a network. The final stage is to document the entire system which provides component and the operating procedures of the system

The implementation involves the following things.

- Proper planning.
- Investigation of the system and constraints.
- Design the method to achieve the changeover.

- Training the method to achieve the changeover.
- Training of the staff in the change phase.
- Evaluation of the changeover meth

### A. Results Screenshots:



Fig. 6.1: Registration form



Fig. 6.2: Login Panel



Fig. 6.3: Image upload panel

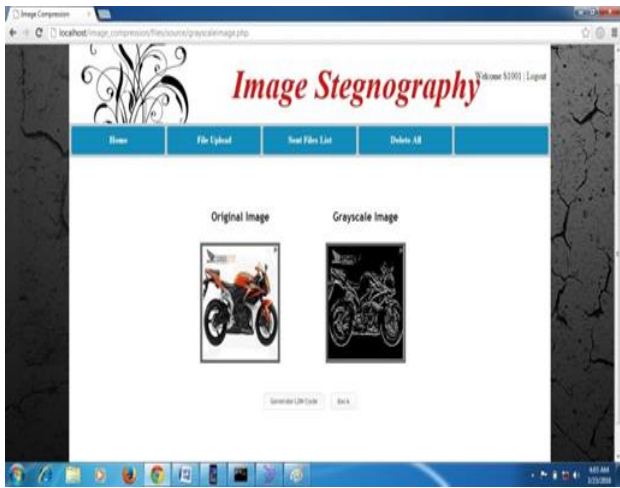


Fig. 6.4: Original image to gray scale conversion

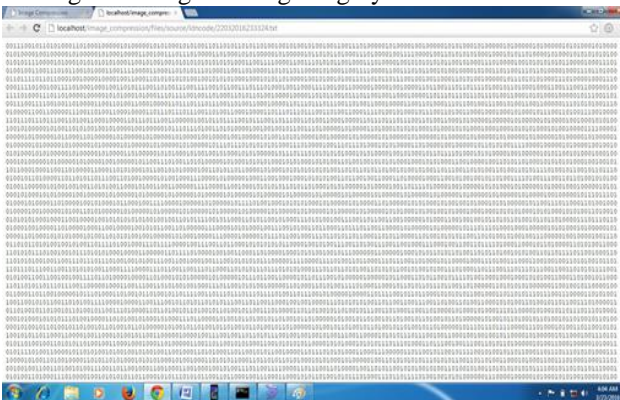


Fig. 6.4: LDN Code generation

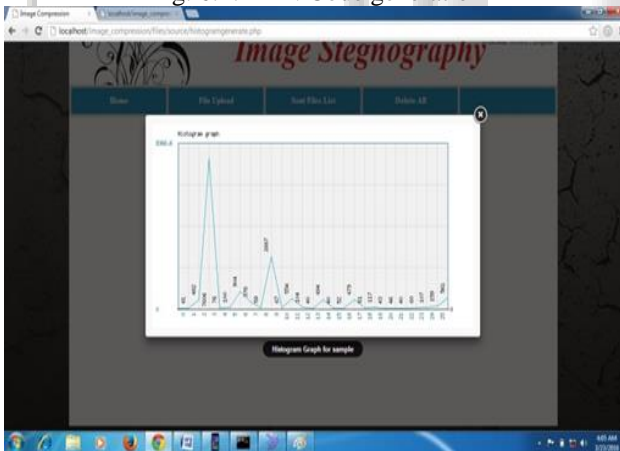


Fig. 6.5: Histogram Graph



Fig. 6.6: Receiver Selection

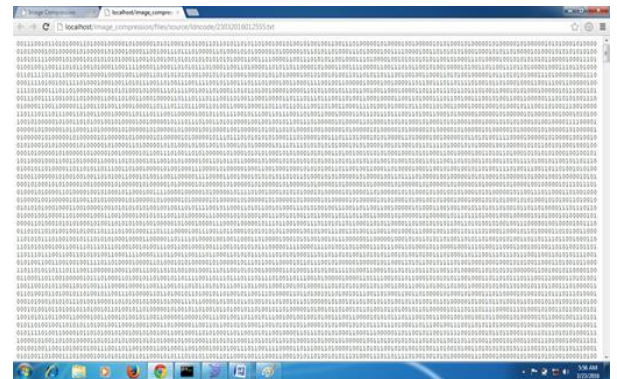


Fig. 6.7: LDN code generation after Decompression

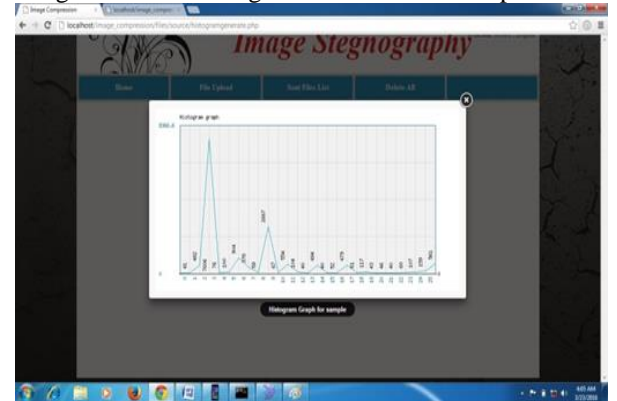


Fig. 6.8: Histogram graph after Decompression

## VII. CONCLUSION

The proposed method is based on analyzing the forward quantization noise. The main contribution of this work is to address the challenges posed by high-quality compression in JPEG compression identification by generating and matching LDN values, histogram, Image Classification Algorithm. Both the compression and decompression the LDN code and the histogram graph should be same so the high quality jpeg compression achieved. The image could transfer without any loss. Now With the conclusion, we develop a simple yet very effective detection algorithm to identify decompressed JPEG images.. We also demonstrate that the proposed method is robust to small image size and chroma sub sampling. The proposed algorithm can be applied in some practical applications, such as Internet image classification and forgery detection. The following objective of my project has been done successfully

- LDN Generation 6digit binary value for each pixel.
- Image Classification Algorithm: We first convert color images into gray-scale images
- Histogram generation for jpeg image.

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