

## DNA Sequencing Based Image Encryption Methods: A Survey

S. Verma<sup>1\*</sup>, S. Indora<sup>2</sup>,

<sup>1,2</sup>CSE Dept, Deenbandhu chhotu ram University of Science and Technology , Murthal, India

\*Corresponding Author: [vermashalu1996@gmail.com](mailto:vermashalu1996@gmail.com)

Available online at: [www.ijcseonline.org](http://www.ijcseonline.org)

Accepted: 20/May/2018, Published: 31/May/2018

**Abstract**— Cryptography is the best piece of the establishment of correspondence security and PC security. Regardless, there are a couple of torpid defects in different built up cryptography advances generally cryptography, for instance, RSA and DES computations—which are broken by some attack programs. DNA cryptography and learning science was considered a while later examination inside the field of DNA preparing field by Adleman. It has transformed into the forefront of all inclusive research on cryptography. Cryptography relies upon natural issues. In this theory, a DNA structure not simply has predictable enrolling power as a contemporary framework, in any case, it has productivity and capacity customary PCs can't coordinate. Utilizing DNA in connection with cryptography is another and energizing investigation bearing. Shockingly, it needs a great deal of assets, it has cutting edge research facility necessities and a few computational constraints. Along these lines, the productive utilization of DNA cryptography is as yet troublesome from a functional perspective. This paper talks about DNA cryptosystem ideas in view of the work of art and present day stance and overviews DNA cryptosystem connected to picture Cryptography field.

**Keywords**— *Cryptography, DNA, DNA Sequence, Encryption, Security*

### I. INTRODUCTION

Encryption is a technique for a client to safely share information over a shaky system or capacity site. Prior to the approach of open key cryptography [1], a generally held view was that for two clients to impart information privately they would need to from the earlier build up a commonly held mystery key  $k$ . While this may be adequate for some little or firmly weave associations, such an answer was plainly infeasible for bigger systems, for example, the present Internet comprising of billions of clients. More than thirty years back, Diffie and Hellman [2] set forth a fundamentally new thought in the idea of open key cryptography, where two gatherings can safely speak with each other without having an earlier common mystery drastically difficult the tried and true way of thinking of the time. Today open key encryption is an important instrument and its utilization is pervasive in building devices from secure web correspondence (e.g., SSH, SSL), to circle encryption, and secure programming patch dissemination. In any case, there is an imbued see that: (1) Encryption is a technique to communicate something specific or information to a solitary element holding a mystery key, and (2) Access to the scrambled information is win big or bust – one can either decode and read the whole plaintext or one adapts nothing at about the plaintext other than its length.

One of the difficulties that scientists confront these days is the means by which to ensure in a private way a protected course for the transmission of sight and sound information through computerized systems. Because of the spread of the

advances of new innovations in systems, individuals from everywhere throughout the world can send and get data, perform extends, and speak with companions by sending pictures and recordings through the web. Sending and accepting such data utilizing pictures and recordings through web and different systems require some sort of secure courses. That is on account of pictures and recordings may join mystery or touchy data, for example, patients' restorative overviews, individual data, high costly attractive plans, and mystery original copies.

The frequent plans used for enciphering represent the region of concentrate called cryptography. Kinds of Cryptography: There are two essential sorts of cryptography:

- (i) Secret key cryptography
- (ii) Public key cryptography

Puzzle key cryptography is also called symmetric key cryptography. With that kind of cryptography, both the sender and the recipient identify a comparative riddle code, known as the key. Messages are distributed by the sender using the key and decoded by the gatherer using a comparable key. Open key cryptography, besides called uneven key cryptography, uses maybe a couple keys for encryption and unraveling. With open key cryptography, keys work in sets of composed open and private keys. Cryptography framework is used when riddle message are traded beginning with one assembling then onto the

following completed a correspondence line. Cryptography strategy needs a few estimation for encryption of data. Nowadays when more delicate information is secured on PCs and transferred over the Internet, we need to affirmation information security and wellbeing. Picture is in like manner a basic piece of our information. In this way it's essential to shield our picture from unapproved get to. There are so numerous calculations accessible to shield picture from unapproved get to.

It has been accounted for writing [3] that an encryption apparatus is a compelling way to deal with ensure such data when sending and accepting information through numerous methods for interchanges. This is on the grounds that the special case who can decode and see such data is the main approved substances that have security keys of unscrambling. In an encryption procedure, the security keys are the center of any encryption and unscrambling calculation. They are utilized to change over the information from a coherent state to a clear gibberish and the other way around. The fashioner of an encryption plan should share the security keys expected to recuperate the first data with planned beneficiaries and subsequently other undesirable people can be blocked [4].

#### A. Image Encryption

Various advanced administrations require dependable security away and spread of computerized pictures. Because of the fast progress of the web in the computerized world today, the security of advanced pictures has turned out to be more essential and pulled in much consideration. The pervasiveness of media innovation in our general public has raised advanced pictures to assume a more noteworthy part than the ordinary writings, which request genuine insurance of clients' security for all applications. Weakness of Traditional Schemes, for example, utilizing RSA based picture Encryption cryptography for encryption is speed [5]. There are numerous mystery key encryption strategies that are altogether quicker than any as of now accessible RSA picture Encryption strategy. In this work we propose a novel low-intricacy symmetric cryptographic calculation. It is created in light of the square encryption structure.



Fig 1: Standard lena (left) taken as a standard and encryption outcome from an algorithm (right)

The encryption part can be actualized by utilizing a straightforward design that exclusive comprises of essential scientific activities (AND, OR, XOR, XNOR, moving, swapping). This can diminish the weight on encoder, in light of the fact that the more mind boggling key extension process is just done at the decoder. Other than disarray and dispersion of information, diverse substitution and change methods are additionally included to complex the figure. The proposed calculation is likewise contrasted with a few existing calculations as far as design, adaptability, and security.

With the frequently increasing advancement of media applications, security is an imperative issue in correspondence and limit of pictures, and encryption is one of the ways to deal with ensure security. Picture encryption techniques endeavor to change over novel picture to another photo that is hard to comprehend to keep the photo private between customers, in other word, it is principal that nobody could turn out to be more familiar with the substance without a key for deciphering. In addition, one of a kind and strong security in Storage and transmission of mechanized pictures is required in different applications, for instance, satellite TV, online individual photograph gathering, helpful imaging systems, military picture correspondences and grouped video meetings, and so on.

In order to achieve such an assignment, numerous picture encryption techniques have been proposed. The picture encryption calculations can be ordered into three noteworthy gatherings:

- (i) position permutation based algorithm
- (ii) value transformation based algorithm and
- (iii) visual transformation based algorithm

#### B. Image Security Using DNA Sequence

Deoxyribonucleic destructive (DNA) [6] is a nucleic destructive that contains the innate rules used as a piece of the advancement and working of all known living structures and a few diseases. It is made out of the most complex common particles. The substance is found in each telephone of living animals and is essential for the character of any living thing, from the *Euglena viridis*, a little unicellular creature encircling among plants and animals, to *Homo sapiens*, introduce day man. The rule some portion of DNA particles is the whole deal accumulating of information. DNA is consistently diverged from a course of action of layouts, like a recipe or a code, since it contains the bearings anticipated that would create diverse parts of cells, for instance, proteins and RNA iotas. The DNA partitions that pass on this genetic information are called characteristics, yet other DNA game plans have assistant purposes, or are locked in with coordinating the use of this inherited information. The information in DNA is secured as a code consist of four compound bases: adenine (A), guanine (G), cytosine (C), and

thymine (T). Human DNA include of around 3 billion bases, and more than 99 percent of those bases are the same in all people. The invite, or gathering, of those bases chooses the data accessible for building and maintaining a living being, similar to the way by which letters of the letters all together appear in a particular demand to outline words and sentences.

The strategy to secure the information may not suite to secure the picture. To secure the picture utilizing DNA grouping can performed in light of Watson-kink run the show. It depicts that the nitrogen bases An (Adenine) combine with T (Thymine) and C (Cytosine) will match with G (Guanine). DNA cryptography [7] is another district of cryptography that has ascended with the investigation of DNA handling, in which DNA is used as information carrier and the propelled natural advancement is used as use gadget. The immense parallelism and remarkable information thickness that are natural in DNA particles are examined for an extensive variety of cryptographic purposes, for example, encryption, confirmation, mark, et cetera.

These days, the field of science and that of cryptography have come to consolidate. DNA has come to be seen as a methods for putting away data and figuring on a goliath scale. The investigation of DNA can be connected in sub-atomic cryptography frameworks that depend on DNA and one-time-cushions, a sort of encryption that, if utilized effectively, is practically difficult to split. The extent of the one-time-cushion can confine the commonsense usage of such a cryptographic framework. There are different techniques for DNA one-time-cushion encryption schemes.[8]

From a cryptographic perspective, DNA is capable. The coupling capacities of nucleotide bases (C-G,A-T) provide the prospect of creating self-gathering structures that are a phenomenal methods for executing calculations. Another preferred standpoint is that DNA has a gigantic putting away limit, however then again essentially utilizing the executions requires a considerable measure of time and assets. Basic and compelling calculations are essential. DNA has an arbitrary character thus the cryptography which depends on it is on a basic level unbreakable. While talking about a DNA-based cryptosystem, carbon nanotube-based message change is to be examined.

There are a couple of DNA-based estimations that have been in every practical sense associated. A case is DNA-based watermarking using the DNA-Crypt figuring [9]. Watermarks that rely upon DNA groupings can moreover be utilized as a piece of demand to perceive the unapproved use of genetically changed life shapes that are secured by licenses. Existing DNA cryptographic and steganographic counts utilize built DNA progressions to store parallel information. They may modify the DNA course of action when they are used on living creatures. The DNA-Crypt count and picture steganography rely upon a comparable watermark-covering principle, particularly using the smallest basic base if there ought to be an event of DNA-Crypt and the base tremendous piece if there ought to be an event of the photo steganography. It can be joined with twofold encryption

estimations like AES, RSA or Blowfish. Changes, which cause changes in the scrutinizing layout, are precarious and are not appropriate for DNA steganography. Transformations, which change a non-synonymous codon to a synonymous codon or the other way around are more critical as these transformations cause blunders in the encoded data. The importance of these blunders relies upon the scrambled data. On the off chance that the scrambled data is a picture, e.g. a logo, there would be just a straight shading shift in the picture, which isn't extremely significant and can be amended effortlessly

Another illustration is a multi-level picture encryption calculation in light of disorder and DNA coding. Mayhem has been given a ton of consideration while talking about picture encryption. For this situation the area of pixels and pixel esteems are changed by utilizing a mix of bedlam and DNA coding. The calculation starts by changing the computerized picture into DNA coding lattice in view of DNA code rules. A while later, the network is separated into four sub-lattices, which are then altered by a calculated riotous arrangement. The sub-grids are then mixed by including new strategic arrangements and getting the new sub-networks. The last advance comprises of joining all the mixed DNA submatrixes in a DNA grouping and translating the mixed DNA framework to a picture matrix.[10]

An approach introduces the manner by which DNA parallel strands can be utilized for steganography, which scrambles by concealing data, with a specific end goal to give fast encryption and unscrambling. It is demonstrated that DNA steganography in light of DNA parallel strands is secure under the suspicion that an interceptor has an indistinguishable mechanical abilities from sender and beneficiary of scrambled messages. Another approach depends on steganography and a strategy for graphical subtraction of parallel gel-pictures. It can be utilized to constitute an atomic checksum and can be joined with the primary way to deal with help encryption.

Utilizing DNA in connection with cryptography is another and energizing examination bearing. Tragically, it needs a great deal of assets, it has innovative research facility prerequisites and a few computational confinements. In this manner, the productive utilization of DNA cryptography is as yet troublesome from a pragmatic perspective.

#### 1) *Advantages of DNA Cryptography*

Since Adleman examined the DNA processing to take care of the combinational issue [11], the DNA figuring strategy has pulled in more consideration. As of late, DNA innovation has been connected to cryptography field because of its incredible qualities, for example, gigantic parallelism, tremendous capacity and ultra-low power utilization. DNA cryptogram uses DNA as data transporter and takes the benefit of organic innovation, which has been indicated promising outcomes in the picture encryption. Since such examinations require nature DNA groupings to encoding the

data, it must be done in an all around prepared lab and needs high cost.

**Speed** - Conventional PCs can perform around 100 MIPS (a great many direction for each second). Consolidating DNA strands as exhibited by Adleman, made calculations proportionate to  $10^9$  or better, apparently more than 100 times quicker than the speediest PC. The intrinsic parallelism of DNA figuring was stunning.

**Negligible Storage Requirements** - DNA stores memory at a thickness of around 1 bit for each cubic nanometer where regular stockpiling media requires  $10^{12}$  cubic nanometers to store 1 bit. Fundamentally, man sorts aggregate information could hypothetically be put away in a little basin of DNA arrangement

**Negligible Power Requirements** - There's no power essential for DNA processing whereas the calculation is going on. The substance bonds that are the building pieces of DNA occur with no outside power supply. There's no correlation with the power requirements of ordinary PCs.

### C. *Disadvantages*

1. Generating arrangement sets, notwithstanding for some moderately basic issues, may require illogically a lot of memory (parcels and heaps of DNA strands are required)
2. Many observational vulnerabilities, including those including: real mistake rates, the age of ideal encoding strategies, and the capacity to perform vital bio-tasks helpfully in vitro (for each right answer there are a huge number of off base ways produced that are useless).
3. DNA PCs proved unable (now) supplant conventional PCs. They are not programmable and the normal dolt can not take a seat at a recognizable console and get the opportunity to work.

### D. *Related Works*

Anwar, Tausif, et al. (2014) [12] In this paper, DNA cryptography is used to scramble message for secure correspondence on a framework. It is an information transport for trading message from sender to beneficiary. For secure correspondence, it isn't simply to encode message yet moreover imperative to stow away mixed message. DNA cryptography is moreover used for disguising the data, Hidden message is known by just sender and gatherer. DNA preparing is used to deal with issues in cryptography, cryptanalysis and steganography. DNA courses of action based data encryption is in every way a promising framework for fulfilling the present information security desires. This paper revolve around the relative examination of some present wears down DNA Cryptography. Message transmission is a procedure to transmit mixed data through secure correspondence channel using DNA cryptography. Text is encoded in DNA progression. Message transmission method decreases the time capriciousness of trading encoded

message. Bio sub-nuclear and one-time-pad developments is used for secure message encryption.

Yang, Jing, et al. (2014) [13] In this paper, with the advancement of DNA preparing, DNA-based cryptography transforms into a making interdisciplinary research field. During this paper, we tend to show another DNA cryptography that endeavors DNA self-gathered structure. Creating usage of the toehold strands affirmation and strand movement, the bit-wise prohibitive or (XOR) action is finished to meet the information encryption and disentangling as a one-time-pad. The security of this structure generally begins from the physical separation and specificity of DNA particles. The system is worked by using complex DNA self-social affair, in which technique of fluorescent acknowledgment is used to execute the banner taking care of. In the proposed DNA cryptography, the XOR action at each piece is done exclusively, thusly the encryption and unscrambling system could be coordinated in a huge, parallel way. This work may show that DNA cryptography has the huge potential applications in the field of information security.

Raj, Bonny B., et al. (2016) [14] In this paper presents a unique symmetric computation within the zone of DNA cryptography. Secure Data Transfer is a basic aspect for data transmission. The transmission of information can be of adjacent or of overall degree. Regardless, it is required to secure information from unapproved get to. Security is basic factor encryption. This procedure proposes a secured symmetric key age process which produces starting figure and this hidden figure is then modified over into definite figure utilizing irregular key created DNA successions, in order to make it entangled.

Kane, Amadou Moctar. Et al. (2016) [15] In this paper, the current advance in DNA sequencing will most likely change the universe of electronic. Henceforth, we went from DNA sequencing that lone research focuses could understand, to compact, small and reasonable apparatuses. In this way, it is likely that in a couple of years these DNA sequencers will be incorporated into our cell phones. The motivation behind this paper is to help this unrest, by utilizing the DNA cryptography, hash capacities and informal communities. The principal application will present a shared element confirmation convention with a specific end goal to help withered strays, outcasts, and casualties of human trafficking to locate their natural guardians on the web. The second application will likewise utilize the DNA cryptography and the informal organizations to ensure informants' activities. For instance, this strategy will enable informants to safely communicate on interpersonal organizations, their data with one grape.

Hossain, Emtious Md Sazzad et al. (2016) [16] This paper proposes another framework for DNA cryptography that utilizes dynamic DNA gathering table to restructure the level of security. whereas handling with secure data, the

essentials alike weight, quicken count and taking care of et cetera are basic problems. Bio-nuclear DNA features have the capability to adjust up to these essentials. Existing DNA cryptographic techniques as a rule consider settled DNA gathering table i.e., DNA bases and as needs be the security is suspected to be broken by the intruder. To beat this control, the proposed framework considers dynamic progression table that distributes unpredictable ASCII characters to DNA gathering table at first. By then a set number of emphases are associated in light of a logical course of action wherever in every cycle the spots of ASCII characters are altered dynamically in the progression table.

Kaur, Sarbjeet, et al. (2016) [17] In this paper, in the present time frame as the rate of data stockpiling and change is rising step by step; so as data security is winding up more basic. System security worried about security which keep information from abuse and change. The Protection of data should be possible with encryption. Numerous conventional numerical calculations utilized for encoding the data or information yet they have limitations. DNA (Deoxyribonucleic corrosive) cryptography is likewise new encouraging procedure for security to data. The paper examine about the innovation DNA cryptography which guarantees secure the information from assaults. There are substantial measure of DNA specialists have been performed to secure the data from assaults and general presentation about cryptography and RLE information pressure strategy.

**Norouzi, Benyamin et al. (2017) [18]** In this paper, we have a tendency to analyze the security of a current picture encryption calculation in light of an inappropriate partial request disordered framework recommended by Zhao et al. The deadly blemish within the cryptosystem is that the key stream created depend on upon neither the plain-picture nor the figure picture. Another primary issue with this calculation is utilizing a similar key (the last key in the keystream) in all encryption conditions. In light of these focuses, it is anything but difficult to recoup the plain-picture and also the keystream by applying picked plaintext assault in just a single plain-picture. Both numerical investigation and exploratory outcomes affirm the chance of this assault. Thus, the cryptosystem under investigation isn't appropriate for cryptography.

**Krishnamoorthy, Kuppusamy, et al. (2017) [19]** In this paper, security of images in transmission medium is most crucial matter found in writing. Encryption of pictures is an approach to secure it from illegal access. During this paper focus on the encryption of pictures by means of piece figures. Taunt figures works at the same time and additionally on pieces. In this section, an encryption strategy using enhanced figure piece tying is planned to scramble RGB shading pictures. For every encryption procedure, key age process is a most imperative stage. The creators proposed problematic key age calculation and this nature enlivened enhancement strategy reveals complex keys, stays exceptionally helpful for

basic leadership in powerful condition. Key age is made as intricate with this numerical model that beats the pickle enter issue exists in existing schemes and updates nature of encryption. After effects of the proposed calculation demonstrate the effectiveness and its protection against different cryptanalytic assaults.

**Niu, Ying, et al. (2017) [20]** In this paper, picture encryption innovation is one of the fundamental intends to ensure the wellbeing of picture data. Utilizing the qualities of turmoil, for example, arbitrariness, consistency, ergodicity, and starting worth affectability, joined with the special space compliance of DNA particles and their interesting data stockpiling and preparing capacity, a powerful technique for picture encryption in view of the disarray hypothesis and a DNA succession database is proposed. In this paper, computerized picture encryption utilizes a procedure of changing the picture pixel dark incentive by utilizing riotous grouping scrambling picture pixel area and setting up superchaotic mapping, which maps quaternary arrangements and DNA successions, and by converging with the rationale of the change between DNA groupings. The bases are swapped under the dislodged runs by utilizing DNA coding in a specific number of emphases that depend on the upgraded quaternary hyperchaotic succession; the arrangement is created by Chen disorder. The figure criticism mode and mayhem emphasis are utilized in the encryption system to upgrade the perplexity and dispersion properties of the calculation. Hypothetical examination and test comes about show that the proposed conspire exhibits superb encryption as well as adequately opposes picked plaintext assault, measurable assault, and differential assault.

#### *E. Conclusion and Future Work:*

During this paper we have specified DNA cryptosystem measures principally in light of the conventional and present day point of view and overviewed DNA cryptosystem connected to photograph Cryptography zone. As the vast majority of these strategies are straightforwardly connected encryption through covering a disordered grouping produced with the guide of an unmarried turbulent guide and the pixel dark cost from the photo. Contrasted with the change, dissemination may prompt better insurance, however the encryption affect isn't magnificent. DNA cryptography and data mechanical know-how was conceived after investigation inside the field of DNA processing region by Adleman. It has end up being the front line of global research on cryptography. Cryptography depends on natural inconveniences. In this hypothesis, a DNA machine no longer most straightforward has customary figuring power as an advanced contraption, at the same time, it has execution and highlight ordinary PCs can't suit. Utilizing DNA in connection with cryptography is a shiny new and fascinating observe course. Shockingly, it needs loads of benefits, it has innovative research facility necessities and a few computational limits. Along these lines, the effective

utilization of DNA cryptography stays hard from a sensible perspective. Accordingly, that permits you to boost the security and the encryption impact, a couple of analysts have blended stage and dissemination. Notwithstanding, an unmarried confused guide used to scramble photo may furthermore bring about a littler key region and lessening assurance, so some new ways to deal with widen productive picture encryption plans were advised. Likewise the spatiotemporal disarray framework to scramble a photo and played out a total investigation of the security of calculations to uncover their calculations have incredible wellbeing with a minimal effort. Existing calculations have littler key space, high affectability to keys, and have the capacity of to look up to traditional attacks and without trouble hackable XOR system for bits.

### REFERENCES

- [1] Stallings, William. *Cryptography and network security: principles and practices*. Pearson Education India, 2006.
- [2] Diffie, Whitfield, and Martin Hellman. "New directions in cryptography." *IEEE transactions on Information Theory* 22.6 (1976): 644-654.
- [3] Pakshwar, Rinki, Vijay Kumar Trivedi, and Vineet Richhariya. "A survey on different image encryption and decryption techniques." *International journal of computer science and information technologies* 4.1 (2013): 113-116.
- [4] Wong, Ping Wah, and Nasir Memon. "Secret and public key image watermarking schemes for image authentication and ownership verification." *IEEE transactions on image processing* 10.10 (2001): 1593-1601.
- [5] Chen, Guanrong, Yaobin Mao, and Charles K. Chui. "A symmetric image encryption scheme based on 3D chaotic cat maps." *Chaos, Solitons & Fractals* 21.3 (2004): 749-761.
- [6] Lindahl, Tomas. "The world of DNA in glycol solution." *Nature Reviews Molecular Cell Biology* 17.6 (2016): 335-336.
- [7] Karimi, M., & Haider, W. (2017). Cryptography using DNA Nucleotides. *Int. J. Comput. Appl*, 168, 16-18.
- [8] Wang, Xing-Yuan, Ying-Qian Zhang, and Xue-Mei Bao. "A novel chaotic image encryption scheme using DNA sequence operations." *Optics and Lasers in Engineering* 73 (2015): 53-61.
- [9] Heider, Dominik, and Angelika Barnekow. "DNA-based watermarks using the DNA-Crypt algorithm." *BMC bioinformatics* 8.1 (2007): 176.
- [10] Srinivasu, P. Naga, and Seshadri Rao. "A Multilevel Image Encryption based on Duffing map and Modified DNA Hybridization for Transfer over an Unsecured Channel." *International Journal of Computer Applications* 120.4 (2015).
- [11] Garg, Aman, and Misal Choudhary. "Analysing And Obtaining The Most Efficient Dna Computing Algorithm." *Journal of Computational Intelligence in Bioinformatics* 8.1 (2015): 1-6.
- [12] Anwar, Tausif, Sanchita Paul, and Shailendra Kumar Singh. "Message Transmission Based on DNA Cryptography: Review." *International Journal of Bio-Science and Bio-Technology* 6, no. 5 (2014): 215-222.
- [13] Yang, Jing, Jingjing Ma, Shi Liu, and Cheng Zhang. "A molecular cryptography model based on structures of DNA self-assembly." *Chinese science bulletin* 59, no. 11 (2014): 1192-1198.
- [14] Raj, Bonny B., J. Frank Vijay, and T. Mahalakshmi. "Secure Data Transfer through DNA Cryptography using Symmetric Algorithm." *International Journal of Computer Applications* 133, no. 2 (2016): 19-23.
- [15] Kane, Amadou Moctar. "How DNA Cryptography can help whistleblowers and refugees." arXiv preprint arXiv:1606.06644 (2016).
- [16] Hossain, Emtious Md Sazzad, Kazi Md Rokibul Alam, Md Rafiul Biswas, and Yasuhiko Morimoto. "A DNA cryptographic technique based on dynamic DNA sequence table." In *Computer and Information Technology (ICCIT)*, 2016 19th International Conference on, pp. 270-275. IEEE, 2016.
- [17] Kaur, Sarbjeet, and Sheenam Malhotra. "A Review on Image Encryption Using DNA Based Cryptography Techniques." *International Journal* 4, no. 3 (2016).
- [18] Norouzi, Benyamin, and Sattar Mirzakhaki. "Breaking a novel image encryption scheme based on an improper fractional order chaotic system." *Multimedia Tools and Applications* 76, no. 2 (2017): 1817-1826.
- [19] Krishnamoorthy, Kuppasamy, and Mahalakshmi Jeyabalu. "A New Image Encryption Method Based on Improved Cipher Block Chaining with Optimization Technique." In *Advanced Image Processing Techniques and Applications*, pp. 133-149. IGI Global, 2017.
- [20] Niu, Ying, Xuncai Zhang, and Feng Han. "Image Encryption Algorithm Based on Hyperchaotic Maps and Nucleotide Sequences Database." *Computational Intelligence and Neuroscience* 2017 (2017).

### Authors Profile

Mr. Sanjeev indora Assistant Professor at Department of Computer Science and Engineering since 2006.he has a total teaching experience of 11 years.His main research area is wireless sensor networks, software project management and web technologies .He has published more than 10 research papers in different journals of repute.

Ms Shalu verma pursued Bachelors of Technology from Kurukshetra Institute of technology and Manager, Kurukshetra,India in year 2016 and currently pursuing Master of Technology in Department of Computer science from deenbandu chhotu ram university of science and technology,Murthal India,Her main research work focus on Image encryption algorithm based on DNA Sequencing