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IMPROVED GENETIC GAUSSIAN ADAPTIVE APPROACH USING ML FOR PAPR REDUCTION IN 6G APPLICATIONS

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Abstract:

With the advent of Network power reduction capabilities in mobile communication have impacted the design that could sustain the latest model design in communication trends. One such feature is PAPR for the mobile communications that have to be reduced while implementing the network model for communication. Most techniques in recent trends in MC have effects the PAPR reduction values less than 10. This paper improvises a novel PAPR reduction filter and optimization characteristic using ISGA for 5G + with improved PAPR values as tabulated. The ISGA algorithm on the OFDM would implicate the power calculation based on mathematical analysis for PAPR. This paper also compares with other existed techniques such as SLM, PTS and clipping.

Keywords: Orthogonal Frequency division multiplexing (OFDM), forward error correction (FEC), Filtered Orthogonal Frequency Division Multiplexing (F- OFDM), Peak to Average Power Ratio (PAPR), Long Term Evolution (LTE), selective mapping (SLM), Partial Transit Scheme (PTS), IGMSGA (Improved Genetic Model using Stochastic Gaussian Approach).

1) INTRODUCTION

In wireless communications, Orthogonal Frequency Division Multiplexing (OFDM) is one of the modulation techniques that is employed. The modulation with multi carriers has been improvised in mobile communication standard from Third to 5th generations as (3G-4G (LTE)-5G) to ensure better network speed and hybrid protocol for communication. Since the complexity of the design for the communication model with the generations (3-5 G's) have their own benefits while utilizing the OFDM. This technology allows for transmission at high data speeds and with a broad bandwidth. In addition, OFDM has the capability of dealing with selective fading and harsh channel circumstances without the need of an equalization filter, which is advantageous. In addition to being appropriate for 5G and multi-service systems, filtered version of OFDM improvising different spectrum features for network sliced values for efficient filter values observed [2]. The design Filtered version of OFDM implicating the data values for each set of cyclic prefix values would add to the network features. Now, as the length of the filter exceeds CP- length which enables the OFDM with different frequency bands with a low signal and carrier interferences [3]. Even if the PAPR values for both of the filtered case and normal structure of OFDM would improvise a newer statistical strategy for implicating the different

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approaches employed to reducing the PAPR for performance characteristics observation [4]. The term PAPR is the average power attained by dividing with system symbol power. The measured peak power with average power ratio would emphasize the different ways of calculating and enhancing the reduction PAPR as considered and include coding techniques, commanding technique, clipping technique, selective mapping technique, and peak windowing technique [5,6] to name a few. PAPR reduction is being accomplished by the use of coding techniques in this study. The concept of coding approach is to pick a code word that is capable of lowering the PAPR for data transfer. (n, k) is the definition of forward error correction (FEC) code, which is categorized as block code, where n is the number of data bits and k is the number of redundant bits. [7] It is possible to lower PAPR by using a variety of coding strategies; however, for the purposes of this study, two types of coding techniques were selected for comparison, namely, arithmetic coding and Reed-Solomon. [8-9] since no research has ever been conducted in order to compare both of these coding methods, and since it compares an ancient approach with a much more recent technology, these two coding methods were selected as a result of this. Another ancient approach, golay code or gray code, is being compared with Reed-Solomon in a large number of additional studies. Arithmetic code, on the other hand, is often compared to the Huffman code or the turbo code on top of that, no such comparison has ever been conducted in FOFDM previously, since the majority of study has concentrated only on this technology [10].

2) CONTRIBUTION

In this paper, with implementation of ISGA algorithm with PTS technique a drastically changes in PAPR is observed and simulated accordingly. The important contributions of this paper are implicated below:

1. To improvise a OFDM PAPR models with reducing PAPR values
2. To effective provide a mathematical solution for PAPR algorithms
3. To optimize the observed PAPR reduction algorithm with ISGA Filter.
4. Finally, tabulate the results of each model with proposed model based on PAPR values.

3) OVER VIEW

This paper has 9 sections of the design analysis of the IGMSGA Filter model for PAPR reduction. In section-1, different models for PAPR with are introduced with its importance of PAPR reduction in current 5g systems. While in section 2 the paper implicates the different solutions that are implemented for current 5g systems with corresponding features of the design on reduction of PAPR. In sections 3-7 the existing design features model on reduction on PAPR with formulations with SLM, Clipping, and PTS techniques. Out of all PTS have been more prominent in design of PAPR but a complexity reduction model with IGMSGA have been implemented with formulations as directed with

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contributions in section 1. An effective comparison with dB via depicted graphs is represented via Mat lab in results section-9. Finally, conclusive response with compared features on PAPR reduction have been observed and mentioned.

4) RELATED WORK

The design in [12] has recommendation was made to decouple the phase information matrix (phase rotation matrix for PAPR reduction and SI matrix for side information concealment) by using a modified PAPR reduction approach termed semi-Hadamard-based selective mapping (semi-HSLM) to construct the phase rotation matrix, we suggested a semi-hadamard matrix generating approach and developed a cyclic shift matrix as the SI matrix. The semi-HSLM uses half as much phase storage as a typical HSLM and reduces PAPR well. [13]has implicated a design was centered on establishing a novel strategy for PAPR reduction, with a particular emphasis on the selective mapping (SLM) methodology, which has been shown to become one of the most effective methods. In this context, two phase's sequences for SLM, namely rows of the standardized Riemann matrix (RM) and orthogonal elements of the altered Riemann matrix (RM), are used in conjunction with each other. Following that, it is recommended that new phase factors be calculated through using rows of any symmetric Toeplitz matrix. [14]. The assessment is carried out utilizing the (CCDF) as a measure of the performance of the suggested strategy in order to evaluate its effectiveness. With improved feature on [16] the Nyquist requirement is met because the total transfer function, defined as a sum of sinusoidal functions such as A sin(x) and B sin(x), has a roll-off area, and the total transfer function has a roll-off region in this example (3x). To meet this continuous bandwidth, need, the coefficients are chosen in such a way that the transmission signal's PAPR is maintained as low as feasible. In general, the MRR filter reduces PAPR by around 0.5 dB and 1 dB, depending on the roll-off values of 0.6 and 1, respectively. When the receiver uses the RRC filter, the MRR filter may be utilized to create a transmitted signal with a low PAPR in commercial wireless communication systems, as illustrated by the above result.

O-OFDM (optical OFDM) PAPR reduction methods studied in this paper may be grouped into the following general groups. Techniques for "signal degradation" (sometimes called "spectral interference"): Before transmission, these strategies distort the O-OFDM signal, hence lowering the PAPR. The terms with clipping and filtering of the signal data with different techniques that suggest on features of companding, windowing, and reduction carrier peaks. According to the idea that high signal peaks occur seldom, the clipping and filtering approach may be used to reduce the signal's peak intensity. However, signal distortion is introduced as a result of clipping. Techniques for companding OFDM signals entail the introduction of nonlinear modification to the signal in order to lower the PAPR values. However, because of this nonlinearity operation, the orthogonality of OFDM is lost, and the performance of the system is deteriorated. These approaches are straightforward to apply, however they cause clipping distortion, which leads in SER deterioration as a consequence. Probabilistic signaling and numerous signaling

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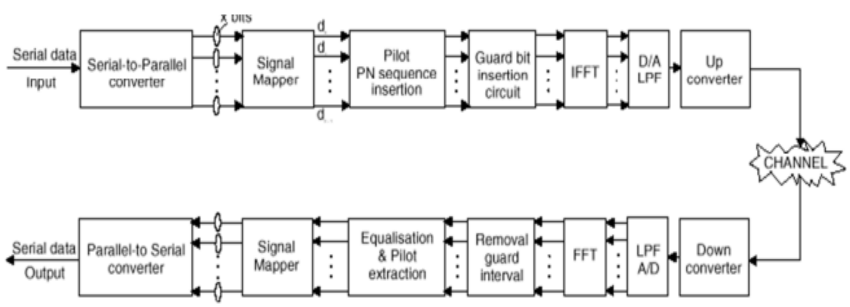
techniques are used. These methods generate a large number of potential signals, all of which contain the identical data, and then choose the one with the lowest likelihood of actually being (PAPR) is the signal that is transmitted. PTS [13], SLM [13], TR [14], and PA [15] are all examples of probabilistic approaches that are often used. PTS [13], SLM [13], TR [14], PA [15] are all examples of probabilistic techniques that are commonly used. Aside from data, most of these approaches often need side information, which limits the usable data rate and increases the computing complexity of the system. Three-factor precoding (precoding) is one of the most straightforward techniques of lowering PAPR [16]. Also in [15], the authors show that DFT precoded layered ACO-OFDM with real and imaginary separation gives superior PAPR performance compared to the classic HS methodology.

5) OFDM SYSTEM MODEL

In this design model, with the criteria of the signal stream of data that has to transit from TX to RX modules in OFDM would provision with a block diagrammatic feature which would suffice the need of communications. In the Fig-1 the OFDM block diagram depicts with the TX modules as S-P converter, Signal mapper, PN sequence insertion, IFFT, D/A Converter, Up-converter/cyclic prefix. Similarly, the vice-versa modules are shown in fig-1.

Figure 1: Representing the OFDM block diagram



The FFT and IFFT blocks serve as the fundamental foundations of an OFDM transceiver. The IFFT algorithm is used on the transmitter side, whilst the FFT algorithm is used on the reception side. An OFDM transmitter converts a serial data stream into concurrent data packets, with the number of elements in a single parallel block equal to the number of sub-carriers, in this case N. After that, the parallel block of data is processed through an N-point IFFT block in order to get the OFDM symbol, which is subsequently used. As a result, the OFDM symbol operates in the digital time domain. At the OFDM receiver, the OFDM signal is transferred across a channel to the receiver, which then converts the signal from a serial to a parallel format. It is necessary to de-map or demodulate this parallel stream of OFDM signal data using one of the demodulation techniques, such as BPSK or QPSK. With the help of the Fast Fourier Transform, this demodulated data is translated from the time domain to the frequency domain (FFT). Finally, the frequency

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domain signal is transformed from parallel to serial mode and received by the receiver at the output port.

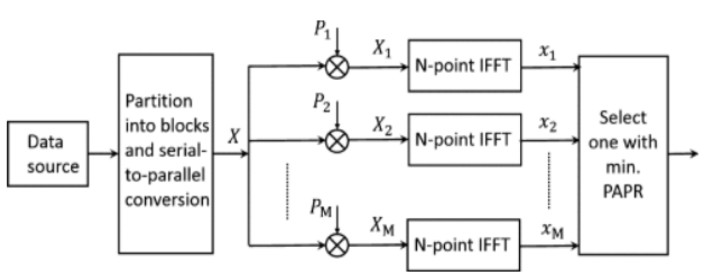
6) PAPR CONCEPT

In the field of OFDM modulation, a high Peak-to-Average Power Ratio (PAPR) has been identified as one of the most challenging practical issues. The nature of modulation itself, in which numerous subcarriers/sinusoids are put together to generate the signal to be transmitted, results in a high PAPR because of its high efficiency. Since there are N sinusoids added together to form a single peak, the peak magnitude would have a value of N, where the (RMS) average might be extremely low owing to destructive interference between the sinusoids. Signals with high amplitudes are generally undesired since they put a load on the analog circuitry. A wide range of dynamic linearity from the analog circuits would be required to handle high PAPR signals, which would result in more costly components and greater power consumption/lower efficiency (for example, a power amplifier would have to run with a bigger tradeoff to preserve linearity) [8]. Observing that certain input sequences result in greater PAPR than others in OFDM systems is a very basic observation. On paper, significant peaks in an OFDM system may be represented as PAPR (peak to average power ratio).

7) SLM TECHNIQUE

To transmit data using this approach, a large number of data blocks containing the identical information are formed, and the data block with the lowest PAPR is chosen for transmission, as seen in Fig-2. Multiplexing modulated symbols with distinct phase vectors before IFFT results in the generation of several data blocks with diverse characteristics. There must be a transfer of information between the transmitter and receiver about phase vectors. Consequently, this technique is not transparent to the receiver, and spectral efficiency is degraded as a result of the transfer of side information during transmission. PAPR reduction capacity of this approach is strongly proportional to the implementation complexity; the greater the number of IFFTs and the greater the number of phase vectors in the implementation, the greater is the PAPR reduction capability.

Figure 2: Representing the SLM block diagram



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8) PTS SCHEME

In PTS, the original data block is fragmented into numerous non-overlapping sub-blocks, each of which has its own unique identifier. Then, these sub-blocks are rotated using rotation factors that are statistically independent of the previous rotation factors. Following that, the signal with the lowest PAPR is selected for broadcast. There are various methods for dividing a data sequence into several sub-blocks, including neighboring partitioning, interleaving partitioning, and pseudorandom partitioning, which are all described in detail below. Additionally, the computational complexity (such as the search for the best phase factor and the use of many IFFT blocks) and low data rate of PTS are significant drawbacks (required side information). Many strategies have been suggested in the literature to decrease the complexity and overhead of search operations (for example, by limiting or eliminating the use of side information). A collection of candidates is created by dividing the original frequency-domain data sequence into many disjoint sub-blocks, each of which is weighted by a set of phase sequences. The last candidate with the lowest PAPR is selected.

9) MACHINE LEARNING MODEL ON ODFM

For decreasing the PAPR in an OFDM system, one of the most common solutions is the clipping scheme [1,] where the original signal is purposely changed in such a manner and its spread of a transmitted signal should be in range of power amplifier's appropriate range. An OFDM system's bit error rate (BER) is deteriorated due to the transmission loss, which is a drawback of the clipping approach, but it lowers its PAPR. These are the disadvantages of the clipping approach. PTS and selective mapping (SLM) [2–3] are two signal scrambling techniques that are useful for lowering PAPR. Adaptive signal processing is another key technique for lowering PAPR (ASP). When using a scrambling technique to transfer information, the phase factor that was used to produce the scrambled signal is required at the receiver in order to exactly reconstruct the information that was sent. When this side information is incorrect, it has a significant influence on the overall functioning of the computer system. It becomes considerably more difficult to determine the phase component that gives the correct scrambled sequence when dealing with signal scrambling because of the significant computational expense of doing so. As an alternate way to reduce PAPR, the nonlinear companding transform was presented in [4].

Despite this, the BER of this system was deteriorated owing to signal distortion, just like it did in the clipping scheme. Deep learning has experienced significant improvements in a variety of disciplines, including computer vision and natural language processing, in the last few years, thanks to the widespread application of these techniques. Since the connections between neurons in the human brain's input and output layers mimic those in an MLP neural network (multiple layer perceptron), this kind of neural network is used for deep learning. Deep learning has the potential to be used in communication systems, as well as cognitive tasks like image recognition, where it could provide an advantage over current techniques. Traditional methods of channel encoding and decoding have

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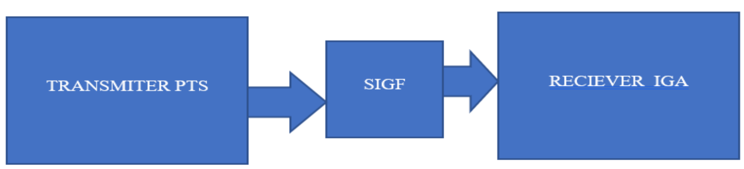
been shown to be less successful than deep learning approaches in several cases. [6] Investigated the detection of radio modulation using convolution neural networks. The high PAPR in OFDM systems can be alleviated by using deep learning techniques. To reduce the complexity of the active constellation extension (ACE) scheme, which is one of the most famous PAPR reduction solutions based on clipping and is one of the most complex schemes. They showed that using an artificial neural network (ANN) did not outperform conventional approaches in terms of PAPR complexity reduction [7, 8]. As a result Deep learning approaches such as batch normalization are not used in these research since they only evaluate shallow neural networks (two layers with two nodes).

10) PROPOSED MODEL USING IGGA.

In this design feature we have improvised a scenario for PTS scheme to effectively reduce the PAPR using ISGA filter. The term ISGA referred with a stochastically Improved Gaussian filter model utilizing the Trans-receiver characteristics. In transmitter our design with SIG filter implicates with spectral and other probability characteristics of PAPR reduction. While receiver on provides the intuitive model on improved genetic algorithm) features to effectively simulate the design with least error identification as proposed for learning model in receiver.

Figure 3: Representing the proposed IGGA-PTS block diagram



The overall design with Transmitter with the consideration of Partial Transmit scheme would effectively solve the noise reduction and PAPR at input feature. While SIGF is utilized to reduce the channel redundancy for data transmit with corresponding harmonics for PAPR. The proposed block diagram implements a Novel scheme with PTS and Genetic Algroithm for transmitting and Reception of OFDM system. The SIGF is utilized with machine learning approach for improving the current problems in PTS and Clipping schemes. The above figure depicts the design feature on implicating the three blocks for operation of the transmission and Reception.

a. Transmitter

As per the PTS scheme, the main problem with its complexity of the design as represented in section 6. So, the proposed model aims to implicate the reduction of the complexity of the design from N^2 Log (N) to

$$\left(\frac{Nlog(\frac{N}{N-1})}{N-1}+\frac{(N-1)Log(N-1)}{N^2-NlogN+1}\right).$$

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To implicate such feature of reduction from values (100 for N=10, 1.53 in other case), the factors

$$\frac{N}{N-1} \& \frac{N-1}{N^2 - NLogN + 1}$$

Are calculated based on IGF filter and improved genetic Algorithm as proposed for Transmitter and receiver characteristics. This approach improvises on different aspects of PAPR reduction with partial blocks transmission via different values observed as mentioned below from the normal PTS case:

Let X be the whole data portioned with M as sub-blocks represented as$X = [X_0, X_1, X_2 \ldots X_{M-1}]^T$. The overall IFFT calculated for the subblock's are

$$x_m = \left[x_{m,0}, x_{m,1}, x_{m,2}, \ldots . x_{m,M-1}\right]^T \quad (1)$$

Where $m = 1, 2{,}3 \ldots M$

Hence the overall reduction feature for PAPR is calculated based on the Phase vectors and its harmonics that actually implicate the increase or decay in PAPR. So, the overall existing PTS scheme for corresponding partitioning for single feature is given by:

$$x^c = \sum_{i=1}^{M} b_m^c x_m = [x_0^c, x_1^c, x_2^c, \ldots \ldots x_{N-1}^c] \quad (2)$$

Where $c = 1{,}2{,}3, \ldots \ldots C$

Hence the overall complexity of the equation 2 is calculated by $C * M\ log(X) = N^2 Log(N)$. As we know for every power value the loop iterations for complexity are estimated with its log values. The overall searching feature for each iteration is reduced with different filter operation as proposed. In first case linear adaptive filter with gaussian probability is utilized to develop a complexity factor of $\frac{N}{N-1}$.

While the other feature has two separate functionality factor N-1 and $\frac{1}{(N^2 - NlogN+1)}$.

The inversive factor $N^2 - Nlog(N) + 1$ is implemented with the proposed SIG filter equation as proposed in 8 (b). So, in this Transmission case we have implicated with probability feature of gaussian mixture model with random variables functionality on IG filter. Let IG_f determines the transfer function of IG filter.

$$X\ be\ the\ input\ feature\ of\ the\ data\ for\ partial\ transit$$
$$Y\ be\ the\ output\ feature\ to\ estimate\ the\ overall\ power$$

Let A, B be the gaussian random variables as implicated with the formulations below:

$$A\left(\frac{x}{t}\right) = \int_{-\infty}^{\infty} f\left(\frac{x}{t}\right) e^{-\frac{jwt}{x}} \quad (3)$$

$$B\left(\frac{x}{t}\right) = \int_{-\infty}^{\infty} g\left(\frac{x}{t}\right) e^{-\frac{jwt}{x}} \quad (4)$$

Both the equations are representing the variation with time dependent features for A and B. In discreate domain the formulation is estimated as:

$$A\left(\frac{x}{n}\right) = \sum_{i=1}^{N} f\left(\frac{x}{n}\right) z^{-\frac{nk}{x}} \quad (5)$$

$$B\left(\frac{x}{n}\right) = \sum_{i=1}^{N} g\left(\frac{x}{n}\right) z^{-\frac{nk}{x}} \quad (6)$$

From equation (5-6) implicates there exists one such probability of the input where$A, B \in x_m$. Hence the overall functionality for the factor on the transfer function is calculated based on the A and B.

$$IF_g = \frac{\sum_{i=1}^{N} b_i^c * f\left(\frac{x}{n}\right) z^{-\frac{nk}{x}}}{\sum_{i=1}^{N} g\left(\frac{b_i^c}{n}\right) z^{-\frac{nk}{x}}} \quad (7)$$

Hence, from the equation (7), we perceive the complexity reduction as, let O (N) be the overall complexity of the IGF while numerator part complexity would be O (N1) and O (N2) for denominator.

$$O(N1) = Nlog(N) \quad (8)$$

$$O(N2) = (N-1)(log(N)) \quad (9)$$

Hence for IGF filter the overall complexity is,

$$O(N) = Nlog(N)/(N-1)log(N) \quad (10)$$

Hence, solving equation 10,

$$O(N) = \frac{N}{N-1} \quad (11)$$

Similarly, with equation 11 we could reduce the overall complexity of PTS functionality in transmitter section. In 8(b) would implicate the SIG filter design and its characteristics via stochastic process.

b. SIGF

In this technique, our design presents a novel stochastic model for improved gaussian filter from the equation 7. Let C_v determines the covariance feature for the stochastic process via stationary feature as:

$$C_v = E[IF_g(t) - x_m(t)(IF_g(t+\tau) - x_m(\tau)))] \quad (12)$$

$$Let\ v(t) = (IF_g(t) - x_m(t))(IF_g(t+\tau) - x_m(\tau))),$$

$$C_v = \sum_{i=1}^{N} v(t) * e^{-jwt} \quad (13)$$

From 12 and 13 equations,

The overall covariance function with its complexity is given by:

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$$O(N_x) = \frac{(N-1)\,log(N-1)}{N^2 - NlogN + 1} \quad (14)$$

Hence the overall complexity for PTS algorithm with IGG approach is stated with equation 11 and 14. With this solution feature, PAPR is calculated and represented in 8(c). Similarly for reception the overall complexity is reduced to$Nlog(N) - log(N) + N$.

c. Recepter

The proposed reception is governed with Improved Genetic algorithm with gaussian variable fitness approach. Let R_x be the reception power estimated to calculate the PAPR.

Algorithm 1: Improved Genetic Algroithm

$Input: IF_g$
$Output: R_x$
$While\ i \le N\ do$
$Initialize\ R_x \leftarrow 0$
$Let\ y_m\ be\ the\ output\ mean\ values\ for\ each\ iteration$
$Let\ t\ be\ time\ initiated\ for\ each\ execution\ of\ observed$
$values\ from\ the\ R_x while\ implicating\ the\ threshold\ as\ T_x$
$Define\ the\ objective\ function\ for\ IGA$
$Define\ T_x \leftarrow PAR_{minx}, PAR_{maxx}$
$for\ x_m \le N$
$Improvise\ a\ new\ y_m\ do$
$for\ x_i \le no\ of\ variable$
$PAR(k+1) = PAR(K) + W_n(PAR_{maxx} - \frac{PAR_{minx}}{k})$
$b_k^c(k+1) = b_{k-1} * e^{\log\left(\frac{b_k max}{b_{k-1} min}\right)}$
for all variable changes do
if $rand(IF_g) < IF_g$
$x_i' = x_i^j \pm rand(IF_g) * b_k^c(k+1)$
else
$x_i' = E(x_i^j) + rand(IF_g) * (PAR_{maxx} - PAR_{minx})$
end if
end for
if $new_{sol} \le worst_{sol}$ then
Accept the new one and replace with worst case
end if
end for
end while

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The above algrotihm improvises the improved gentic algroithm with PAPR reduction using equations 7,11 and 14. To effective reduce the overall PAPR we have utilzied the formulation as:

$$\mathrm{PAR}(k+1) = \mathrm{PAR}(K) + W_n(\mathrm{PAR}_{maxx} - \frac{\mathrm{PAR}_{minx}}{k}) \quad (15)$$

The overall equation 15 implicating the different selective features of wegihts from IGA as stated with W_n. The weight factor is estimated based on the covergence criteria for the covariabce matrix propsoed in section 8(c) with representation of fitness function in figure4.

$$C_v = \sum_{i=1}^{N} v_i(t) * e^{-jw_i t} \quad \text{from (13)} \quad (16)$$

$$W_n = \lim_{t \to 0} C_v(t) \quad (17)$$

From 15 and 17 we have depicted the overall PAPR reduction formulation using IGA. With this feature of PAPR reduction the overall updated weights are givn by:

$$\mathrm{PAR}(k+1) = \mathrm{PAR}(K) + \lim_{t \to 0} C_v(t)\left(\mathrm{PAR}_{maxx} - \frac{\mathrm{PAR}_{minx}}{k}\right) \quad (18)$$

The figure-4 represents the Improved genetic algroithm with PTS algrotihm and its PAPR reduction weight equation is represented with equation 18. In this technique, at covergence feature equation 18 is applied to the IGA ensuring the correct PAPR reduction feature on the propsoed design. To provide a optimal solution of the operations based on selection, crossover and mutation, an weighted solution to reduce the PAPR is represented with precise optimal soluton using IGA in figure 4.

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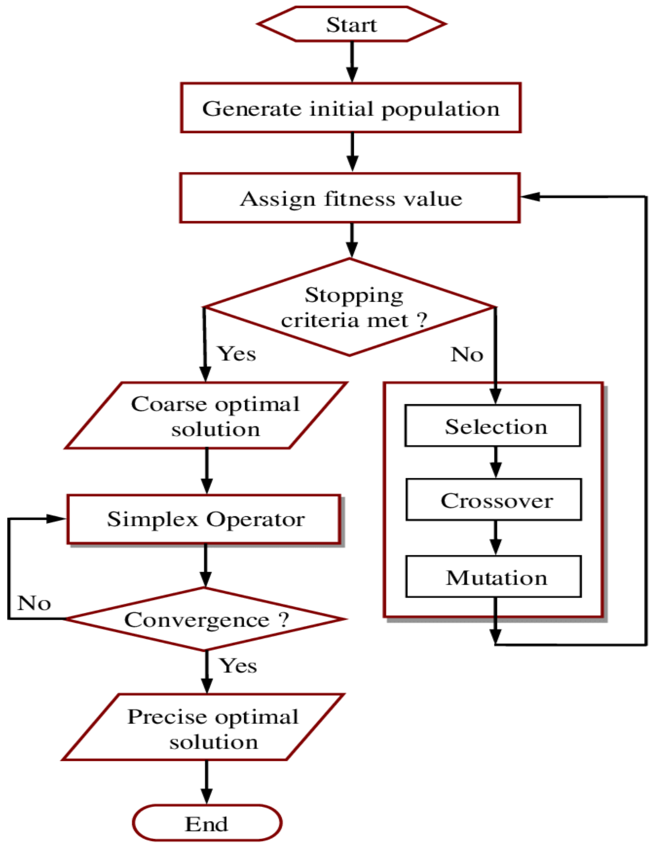
Figure 4: Representing the Flow diagram of Improved Genetic algorithm for PAPR reduction



11) RESULT AND DISCUSSION

The simulation is implemented using MATLAB-2019b with formulation on equation 18. The overall implementation of the proposed PTS technique is compared with clipped, SLM and original PTS technique. The design featuring with clipping model as mentioned in section 4, with SLM and PTS technique. While the proposed model is implemented with two different filters (IGF&SIGF) inclusive of improved genetic algorithm implicating the overall PAPR reduction via equation 18.

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Figure 5: Representing the Clipping technique on mean PAPR values

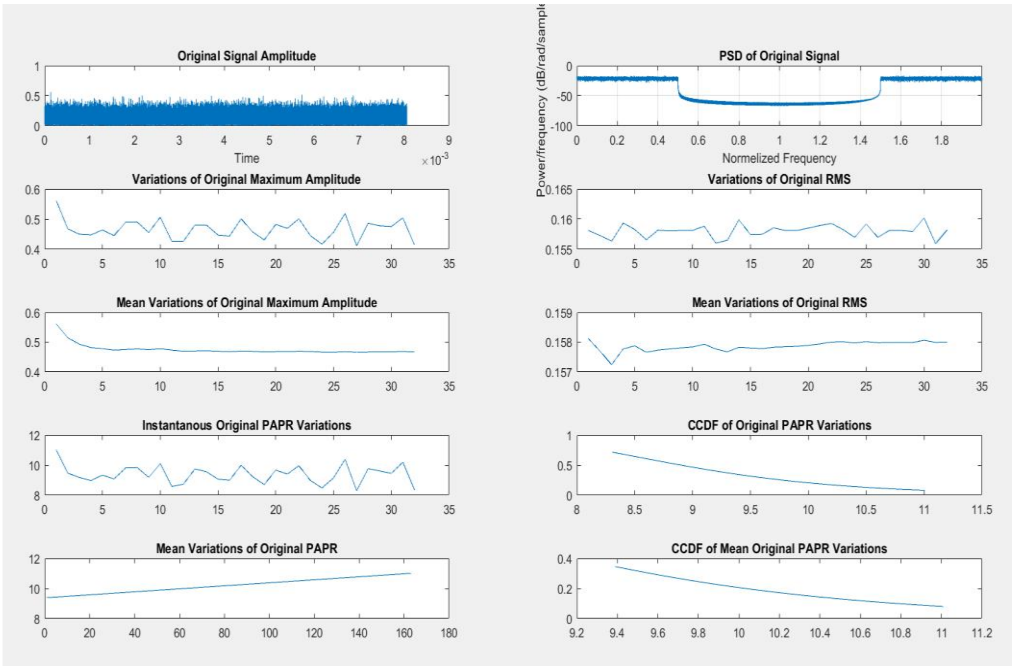

Figure 6: Representing the clipping technique with RMS variations on mean PAPR values

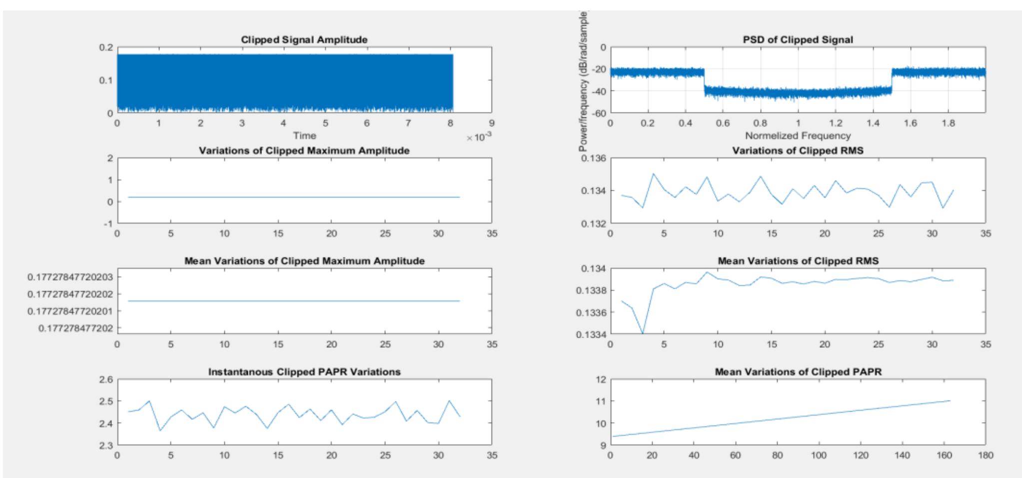

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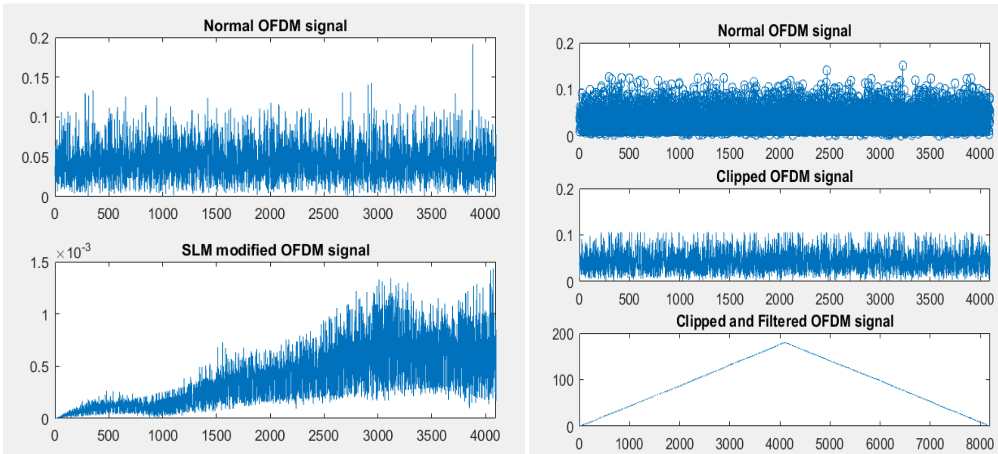
Figure 7 (A-C): Representing the SLM technique for OFDM signal using Clipping feature



The figure 5-6 represents the overall clipping technique feature for each type of formulations utilized with CCDF and PDF formulations as mentioned below. These formulation with CCDF, PDF is utilized with mean and RMS values for PAPR reduction. The average PAPR value for clipped signal is found in figure 6 at last part is around 11dB. While figure 7 depicts the overall SLM method with clipping feature and it's Normal, clipped OFDM signals are represented with and without zero padding.

PROPOSED METHOD USING IGA - PTS

In case of proposed method PTS with IGGA, SIGF models are utilized with formulation as mentioned from equation 7 to 18. These features solution weights are estimated with different variations i.e., iterations for the 5G+ OFDM implementation. Figure 8-9 representing the carrier phase and magnitude of the OFDM signal utilized with IGG algorithm. Figure 10 represents the overall spectrum of OFDM signal and its characteristics via proposed PTS-IGG model. The 11-12 represents the phase and magnitude of received signal magnitude and phase.

Figure 8: Representing the Magnitude response for ODFM signal

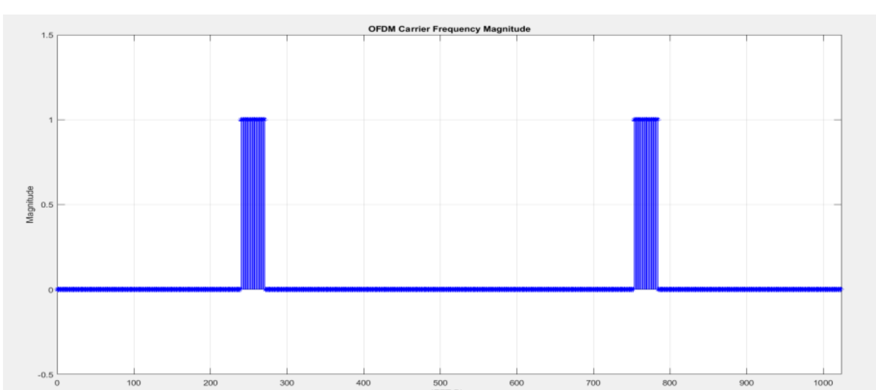


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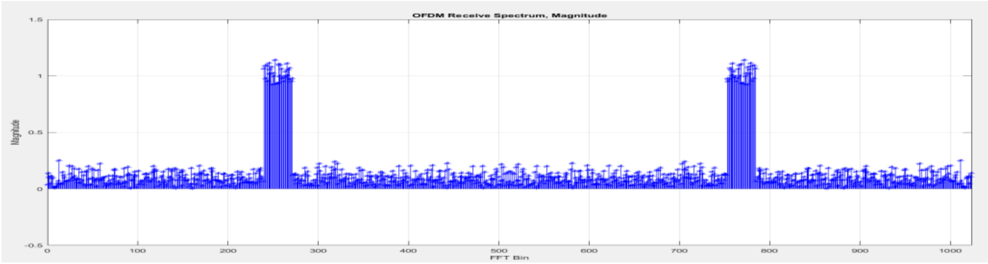
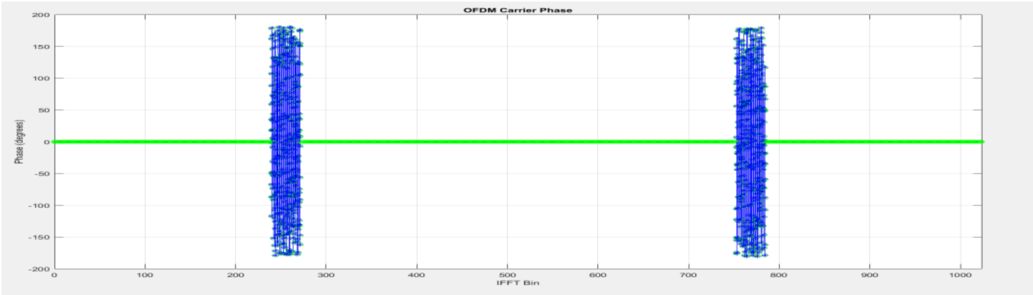
FIGURE 9: (a)Representing the Magnitude Response Recived Signal. (b) Representig the OFDM Carrier Phase. (c) Representing the Phase response for Received signal. (d) Reperesenting the Signal Spectrum for OFDM Signal

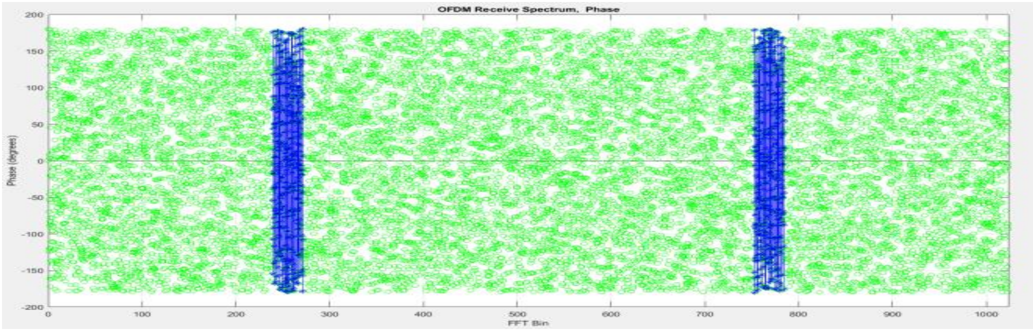
(a)



(b)



(c)



(d)

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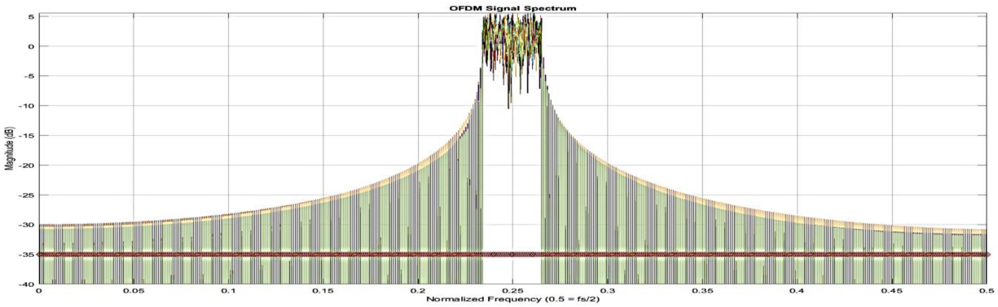

Figure 10: Representing overall PAPR reduction results with original clipping, PTS and SLM techniques utilized

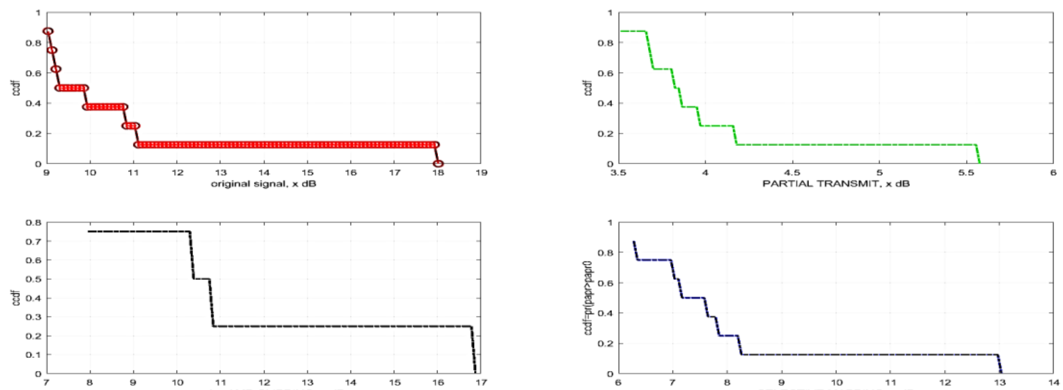

Figure 11: Representing overall Convergence for the best fitness value for PAPR

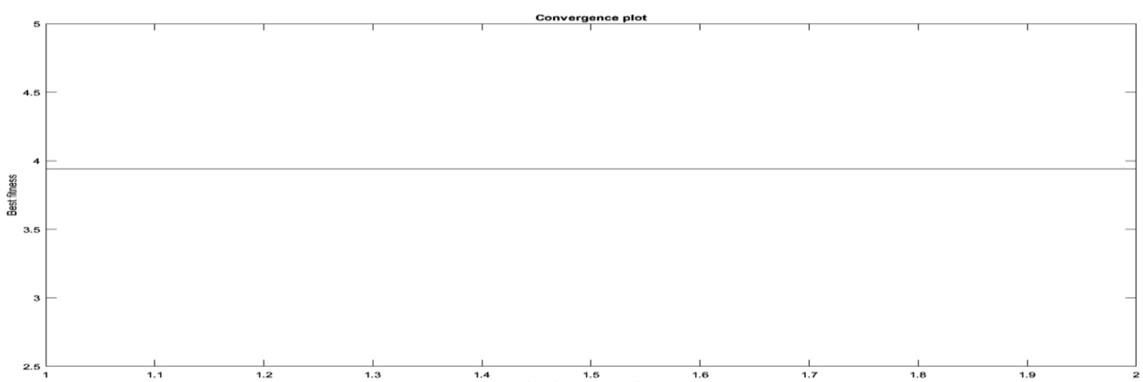

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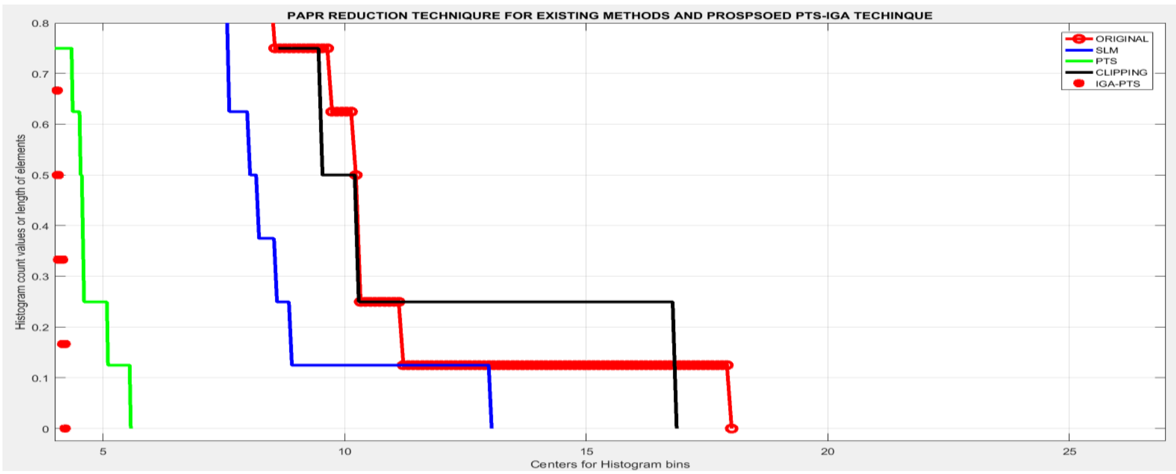
Figure 12: Representing overall PAPR reduction results with original, clipping, PTS, SLM and proposed IGA-PTS techniques



The figure 10 is plotted with different sub blocks of the techniques as SLM, Original, Clipped and PTS are represented with its weight formulation on the PAPR reduction formulation as mentioned above. We observed that PTS scheme provides 5.7 dB for PAPR while others provide more than 10 db. Hence results in most prominent featured technique for PAPR reduction. Our proposed design with reduction complexity of PTS is applied with IG algorithm ensuring the overall fitness value at 3.94. Hence the Overall PAPR reduction feature for the proposed design is 3.94 in figure 11 and 12. The Results evaluation as follows

Generation = 2; Best Individual Fitness = 3.94

Best Solution = -52.8738 7.21316 -33.4976 82.6937

Elapsed Time is 34. 422063 Sec

12) CONCLUSION & FUTURE SCOPE

PAPR estimation and reduction is most challenging task with different possibilities of the OFDM signal to inculcate the reduced PAPR. Our proposed design features with two different filters are utilized with improved genetic algorithm and improved Gaussian filter model with stochastic feature are mentioned effectively to reduce the PAPR. With the proposed formulation equation 18 reduces the PAPR of original 18dB to 3.94dB as mentioned via best fitness function in figure 14. The figure 15 represents the comparative response of the different techniques utilized on PAPR reduction. Finally, an outperform featured equation have been developed to implicate the PAPR reduction with a factor of more than 80% reduction rate. While PTS and Proposed IGGA-PTS are difference of 1.9 dB which is a significant improvement when compared to other techniques. A Gaussian

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decent algorithm is applied to inculcate a novel weight reduction pattern to reduce the complexity and PAPR for 5G+ applications.

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