CHAPTER 5

COMPARATIVE ANALYSIS OF RESULT AND DISCUSSION

In this section, the comparative study is done, for the techniques which have been applied in the previous chapter. The various evaluation metrics particularly Peak signal-to-noise ratio (PSNR), Normalized Correlation (NC) are done. Denial-of-Service Attack (DSA), Man-in-the-Middle Attack (MMA) and Brute-Force Attack (BFA) have been performed for without attack and with the attack by using three optimization algorithms such as Enhanced Social Spider Optimization (ESSO) algorithm, Social Spider Optimization (SSO) algorithm and Cuckoo Search.

5.1 Efficiency analysis of Optimization Algorithm

A comparison of the different optimization algorithm is presented in Figure 5.1 shows the efficiency in percentage.

![Efficiency of Optimization Algorithm](image)

Figure 5.1 Efficiency of Optimization Algorithm
It can be observed that from the figure 5.1 the Enhanced Social Spider Optimization algorithm shows higher efficiency which is 6.68% higher on an average when compared to the Social Spider Optimization algorithm and Cuckoo Search algorithm. From this it is concluded the proposed work crypto-stegno performs better.

5.2 Comparative analysis of Peak Signal to Noise Ratio

Peak signal to noise ratio determines the success rate of an image when the information was embedded. The higher the PSNR value, the higher the quality of an image.

![Performance measure of Peak Signal to Noise Ratio](image)

**Figure 5.2 PSNR value of image for SSO, ESSO and CS**

According to the statistics of Figure 5.2, the peak signal noise ratio of sso is greater than cs, but it is lesser than the esso. It is due to the unique enhanced social spider optimization and cryptographic algorithm which was used for encryption and decryption. The signcryption algorithm provides better security and less computational weight compared to other algorithms which were existence. It can be observed that from the figure 5.2 enhanced social spider optimization algorithm shows
higher psnr which is 6% higher, on an average when compared to the Social Spider Optimization algorithm and Cuckoo Search algorithm.

5.3 Comparative analysis of Normalized Correlation

Normalized Correlation computes the normalized cross-correlation of matrices. Normalized value of the image is compared with attack and without attack and normalized correlation is always less than one for the entire optimization algorithm and it shows that enhanced social spider optimization algorithm performs better.

![Normalized Correlation](image)

**Figure 5.3 NC value of image for ESSO, SSO and CS**

According to the statistics of Figure 5.3, the normalized correlation of sso is much higher than cs when applied to a different image. It can be observed that from the figure 5.3 the Enhanced Social Spider Optimization algorithm shows higher NC which is 0.03% higher on an average when compared to the Social Spider Optimization algorithm and Cuckoo Search algorithm.
5.4 Comparative analysis of Cryptographic Algorithm

The overall execution time of the proposed method is less when compared with the existing method (Babu 2015). Figure 5.4 reveals the overall execution time for both proposed method as well as the existing method, here blowfish algorithm, RSA and DES algorithm are considered for evaluation of performance. It shows that proposed crypto-stegno along with signcryption algorithm takes minimum time for execution.

<table>
<thead>
<tr>
<th>Method</th>
<th>Execution time (ms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signcryption</td>
<td>3539</td>
</tr>
<tr>
<td>Blowfish</td>
<td>34109</td>
</tr>
<tr>
<td>RSA</td>
<td>196451</td>
</tr>
<tr>
<td>DES</td>
<td>47541</td>
</tr>
</tbody>
</table>

Table 5.1 Comparative analysis of execution time of Cryptographic Algorithm

Table 5.1 shows the execution time of various algorithms and it is clear that the signcryption algorithm takes less time to execute.

Figure 5.4 Comparative analysis cryptography algorithms for execution time
Figure 5.4 shows the execution time of signcryption, blowfish, RSA and DES. It can be observed that from the figure 5.4 the signcryption algorithm takes less time compared to other algorithm. From this it is concluded that signcryption algorithm which is applied in crypto-stegno technique along with enhanced social spider optimization algorithm is good for securing the data in the cloud.

5.5 Summary

A comparative analysis of the three optimization algorithm, Enhanced Social Spider Optimization algorithm (ESSO), Cuckoo Search (CS) and Social Spider Optimization (SSO) algorithm along with signcryption algorithm is done. Among the three algorithms, each algorithm can be suited for different applications which depend on the performance of the requirement. The ESSO algorithm along with signcryption algorithm for images performs better among the three algorithms compared. Moreover the signcryption and steganography technique is essential for securing the data in cloud. In future the crypto-stegno will play vital role in all kinds of business for securing the data.