Steganography in Color Animated Image Sequence for Secret Data Sharing Using Secure Hash Algorithm

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Abstract

This paper presents a high capacity steganographic approach with secret message validation scheme at the receiver end. The proposed idea develops specifically for animated GIF, the cover media, to conceal secret text messages where Least Significant Digit (LSD) method is employed to embed secret information in the form of ASCII value. To validate the secret information at the receiver end, the secret text is encoded with Secure Hash Algorithm-1(SHA1) which is subsequently embedded in certain pre-defined portion of the cover media. The proposed algorithm is experimented on a large set of colored animated image sequences by varying text messages which produces satisfactory results. The proposed method also maintains good visual perceptibility while securing high embedding capacity

Full Text

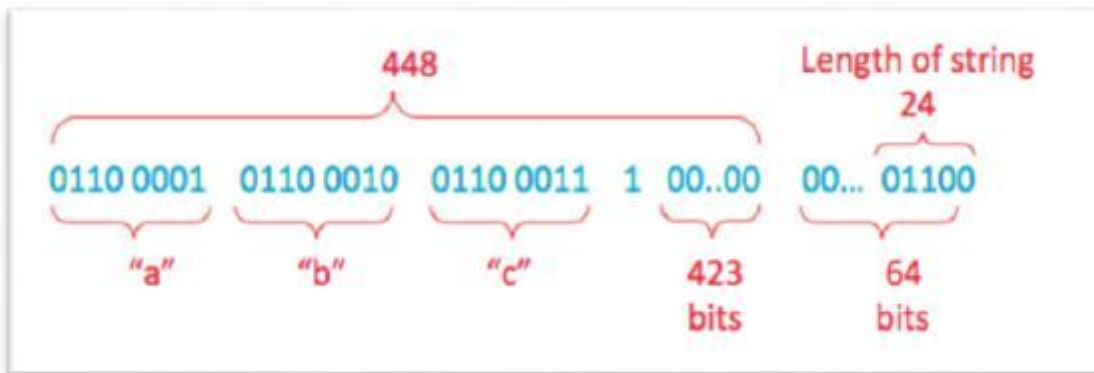This preprint is available for download as a PDF.
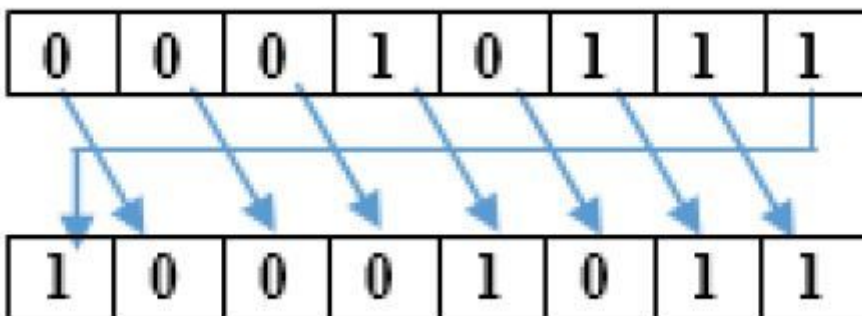
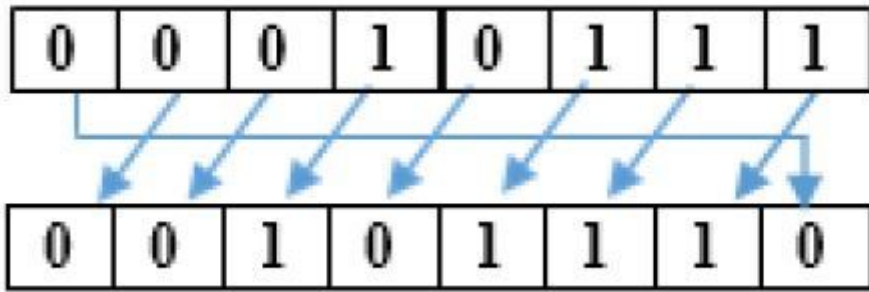# Figures

Figure 1

Step 2 example

Figure 2

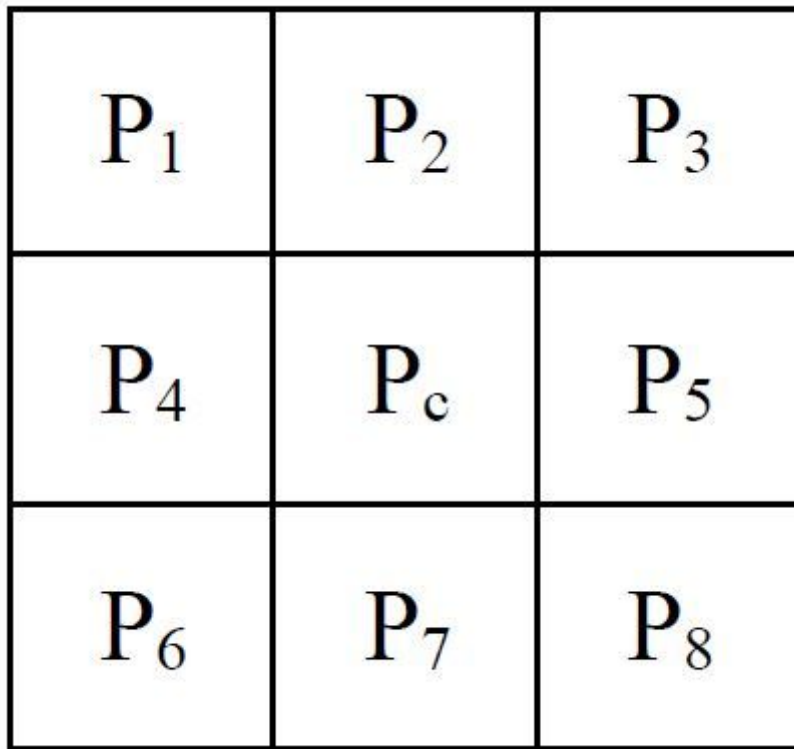Right Rotate

Figure 3

Left Rotate

Figure 4

Pixel Block

160	162	160
158	162	160
161	159	168

Figure 5

Pixel Block with value

ASCII-String= "12345678"

160	162	160
158	162	160
161	159	168

Figure 6

Old Block

161	162	163
154	162	165
166	157	168

Figure 7

New Block
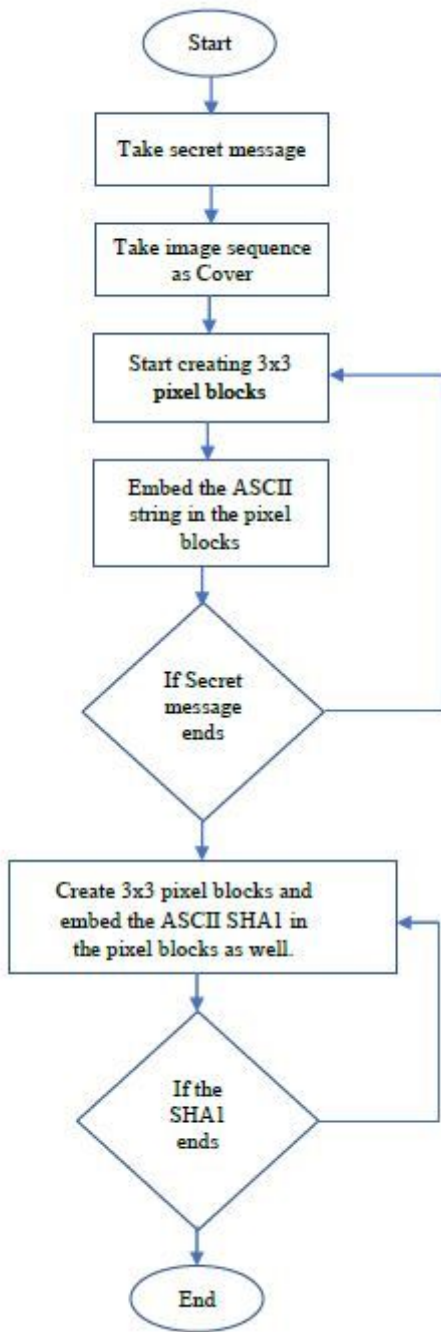
Figure 8

Flow chart

240	230	227	231	240	251	230	247	239	230	251
235	210	200	205	200	240	230	227	231	240	240
231	240	251	230	247	235	210	200	205	200	210
240	240	230	227	231	240	230	227	231	240	251
231	240	251	230	247	239	230	251	230	247	239
240	240	230	227	231	231	240	240	230	227	231
235	210	200	205	200	205	200	210	200	205	205
240	230	227	231	240	231	240	251	230	247	231
239	230	251	230	247	240	230	227	231	240	251
231	240	240	230	227	210	200	205	200	198	251
205	200	210	200	205	251	230	247	239	230	240
231	240	251	230	247	198	240	240	230	227	231
251	230	247	239	230	239	230	251	230	247	251
240	230	227	231	240	231	240	240	230	227	240
210	200	205	200	198	205	200	210	200	205	251
251	230	247	239	230	231	240	251	230	247	210
240	240	230	227	231	200	198	251	230	247	240
231	240	251	230	247	239	230	251	230	247	239

Figure 9

Cover Frame

240	230	227
231	240	251
230	247	239

Figure 10

3x3 pixel block from cover frame

246	235	228
233	239	246
237	247	233

Figure 11

New embedded Values

246	235	228
233	239	246
237	247	233

Figure 12

New embedded Values

246	235	228	233	239	246	237	247	233	230	251
235	210	200	205	200	240	230	227	231	240	240
231	240	251	230	247	235	210	200	205	200	210
240	240	230	227	231	240	230	227	231	240	251
231	240	251	230	247	239	230	251	230	247	239
240	240	230	227	231	231	240	240	230	227	231
235	210	200	205	200	205	200	210	200	205	205
240	230	227	231	240	231	240	251	230	247	231
239	230	251	230	247	240	230	227	231	240	251
231	240	240	230	227	210	200	205	200	198	251
205	200	210	200	205	251	230	247	239	230	240
231	240	251	230	247	198	240	240	230	227	231
251	230	247	239	230	239	230	251	230	247	251
240	230	227	231	240	231	240	240	230	227	240
210	200	205	200	198	205	200	210	200	205	251
251	230	247	239	230	231	240	251	230	247	210
240	240	230	227	231	200	198	251	230	247	240
231	240	251	230	247	239	230	251	230	247	239

Figure 13

Stego-frame

160	165	161
151	162	161
160	154	166

Figure 14

Old Block

160	165	161
151	160	161
160	154	166

Figure 15

New Block

245	233	224
239	239	249
237	240	231

Figure 16

Example Block

245	233	224
239	239	249
237	240	231

Figure 18

Example Block

Figure 19

PSNR 35.21

GIF   Input   Output
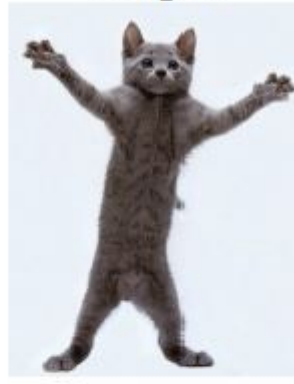
Frame 1

Dancing cat.gif

Frame 2

Frame 3

Figure 20

PSNR 35.38

GIF · Input · Output

Fireball.gif

Frame 1

Frame 2

Frame 3

Figure 22

PSNR 35.34

Frame 1

Frame 2

Frame 3

Figure 23

PSNR 35.92

GIF — Input — Output

Itachi.gif

Frame 1

Frame 2

Frame 3

Figure 24

PSNR 35.29
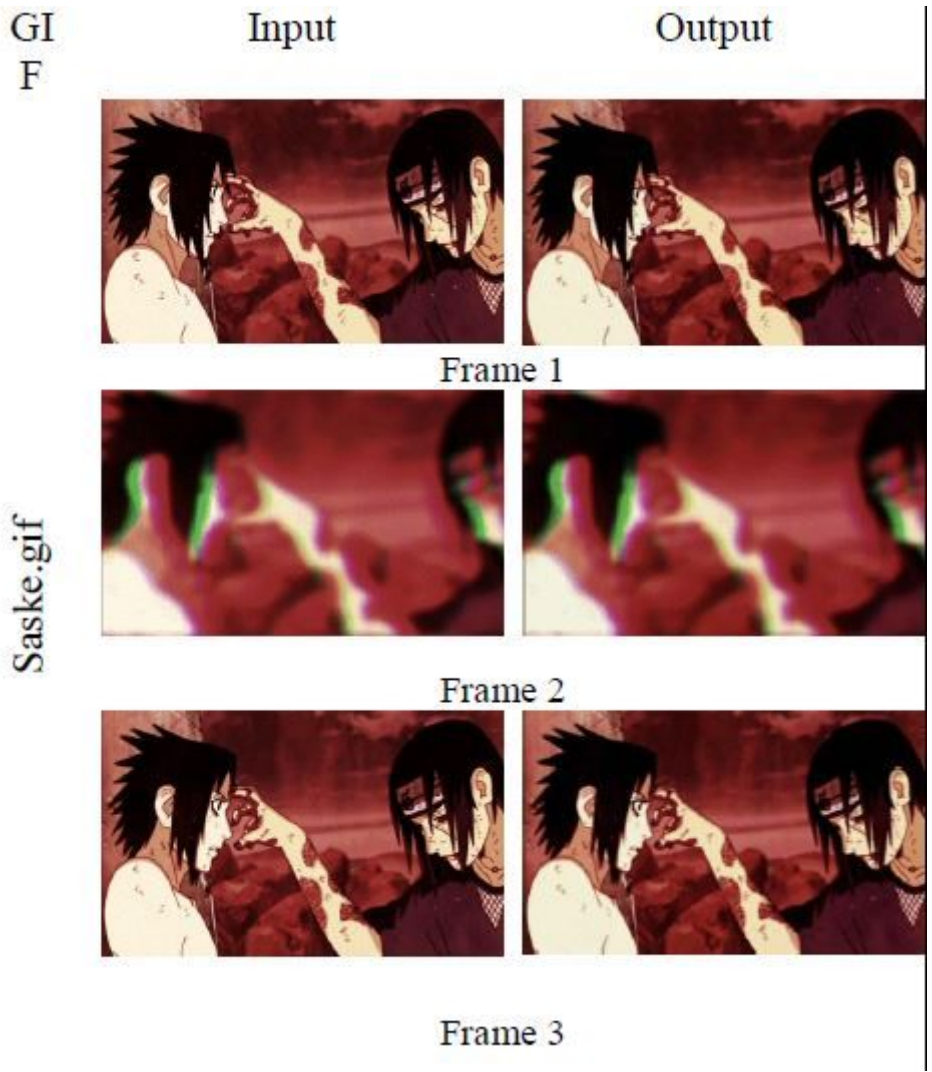
Figure 25

PSNR 35.24
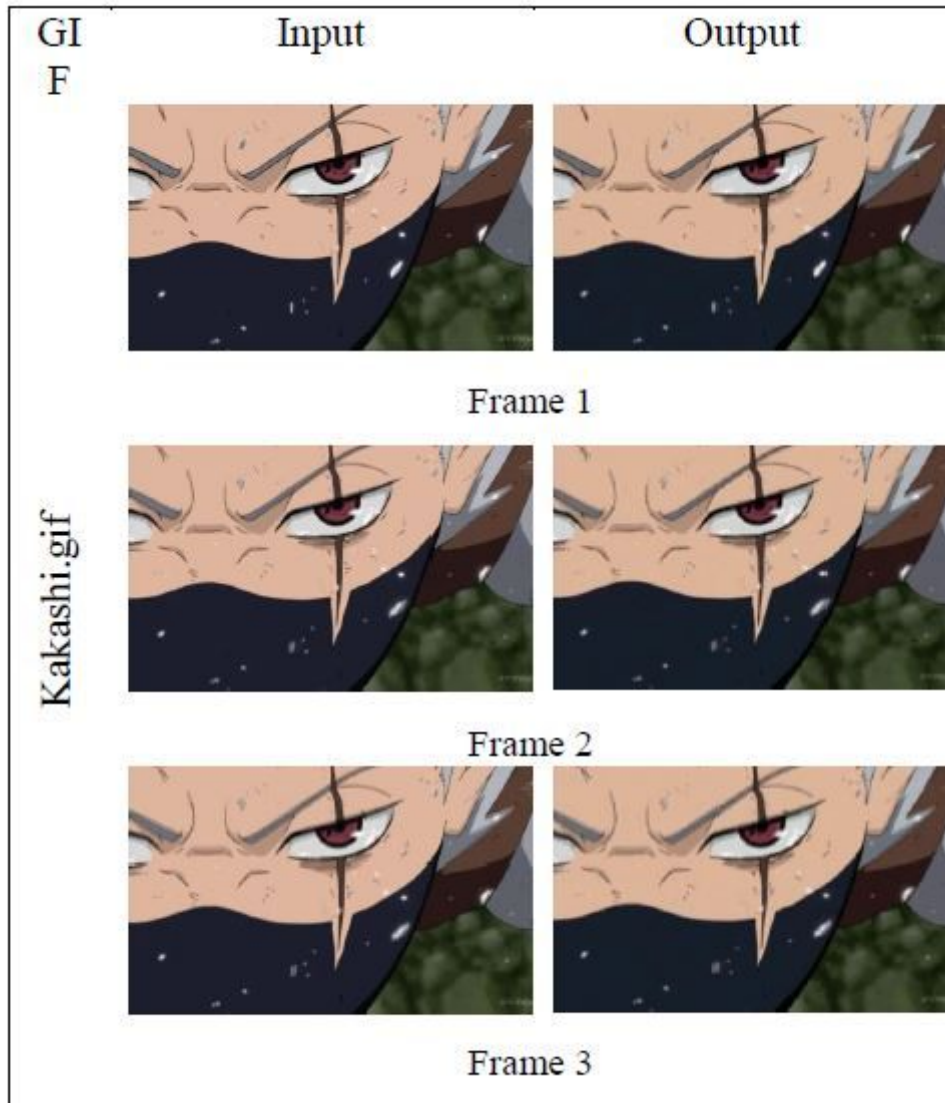
Figure 26

PSNR 36.01
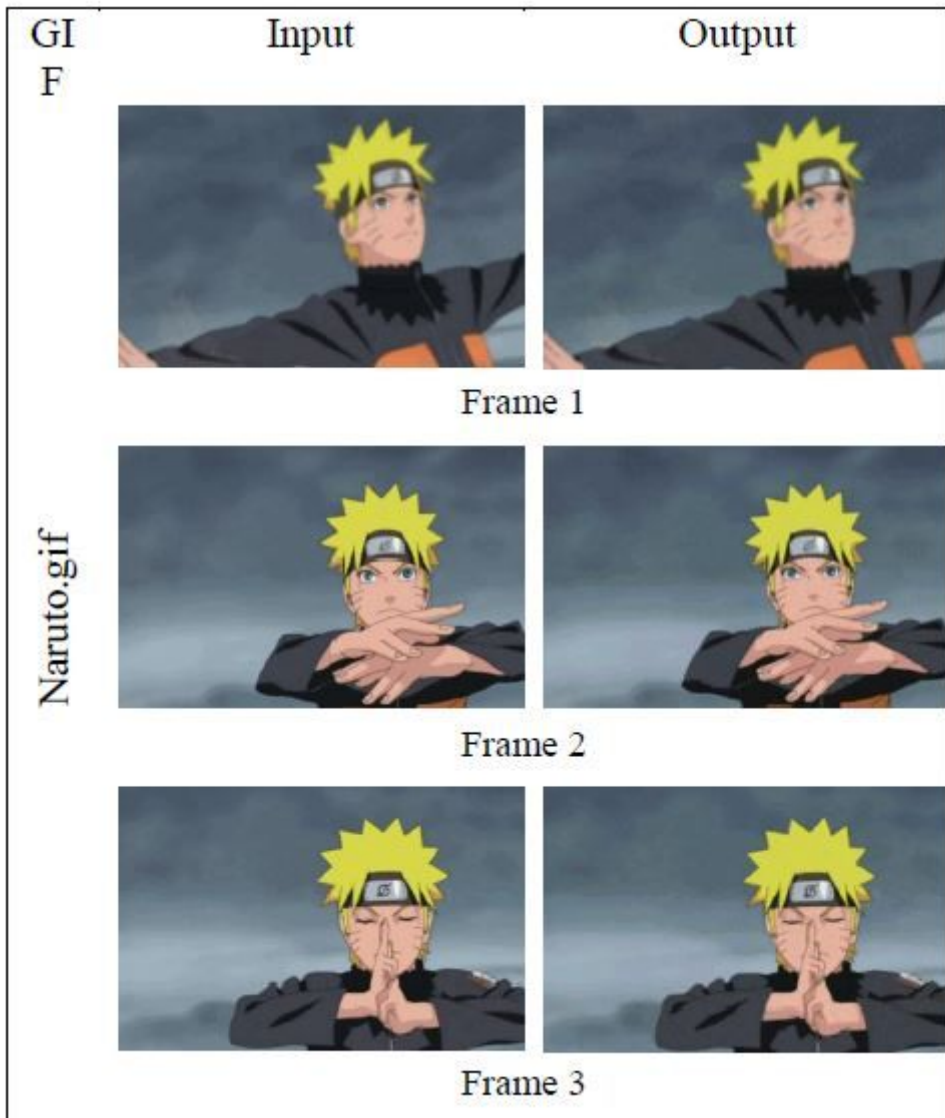
Figure 27

PSNR 36.09
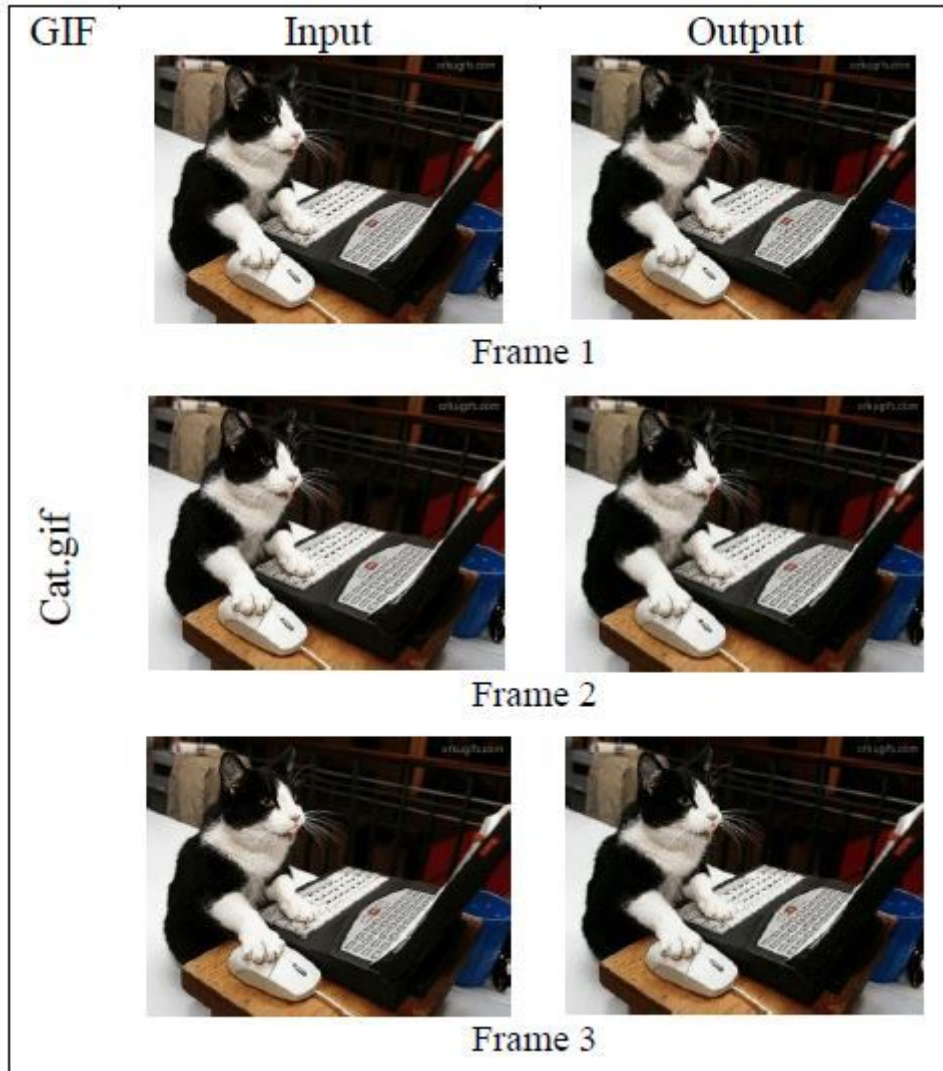
Figure 28

PSNR 35.51
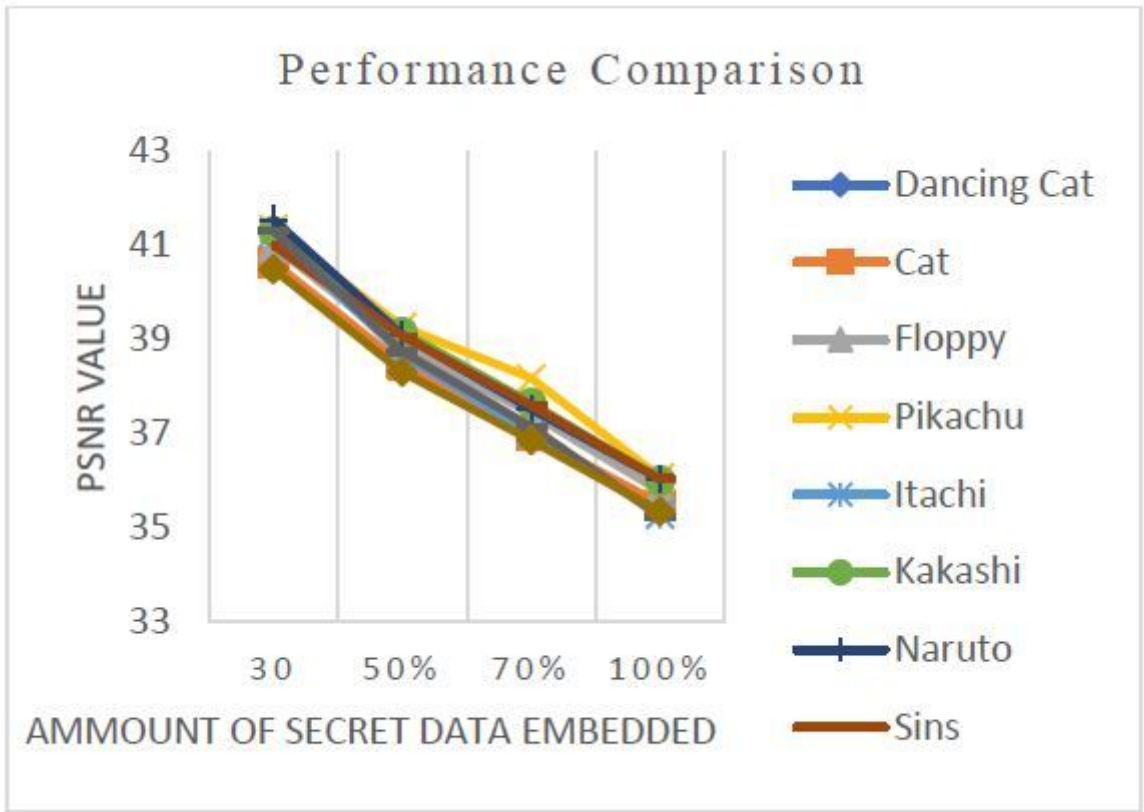
Figure 29

Performance comparison of proposed method with test GIFs scheme

Method	GIF	PSNR	Capacity
SGSAHP D		36.83	74 Kb
Proposed		36.03	1.8 Mb

Figure 30

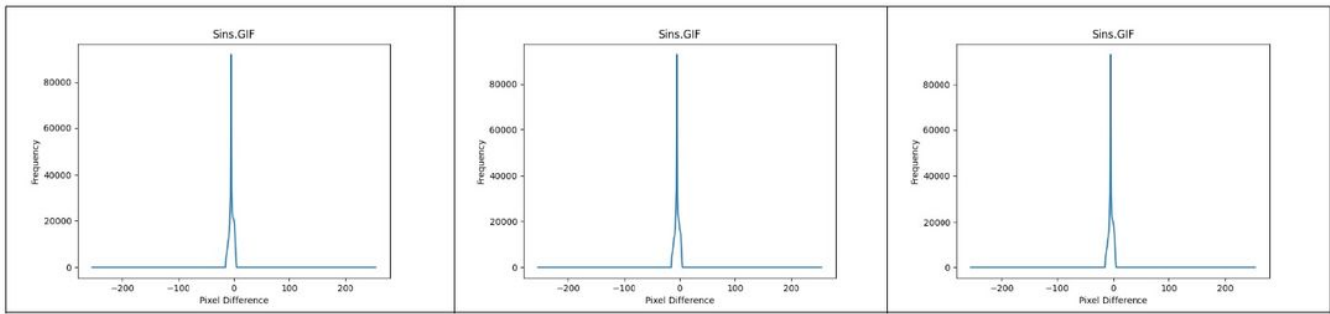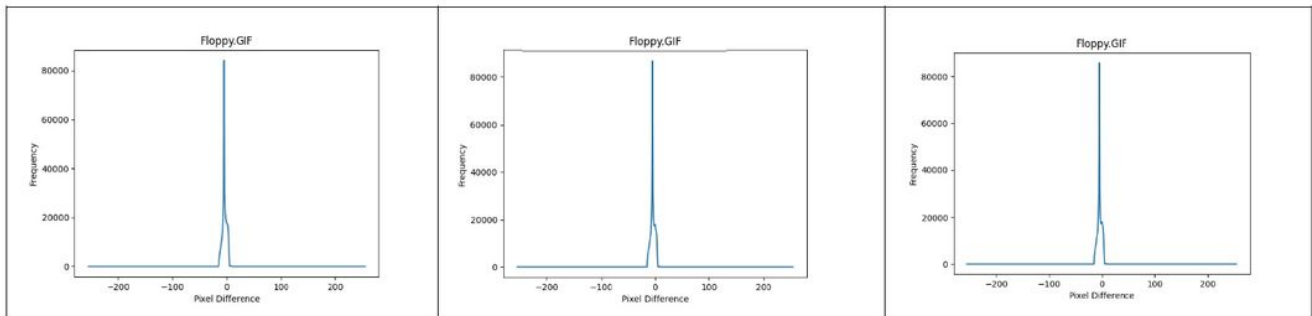Comparison between Steganography in gray scale GIF Using HASH based pixel value differencing
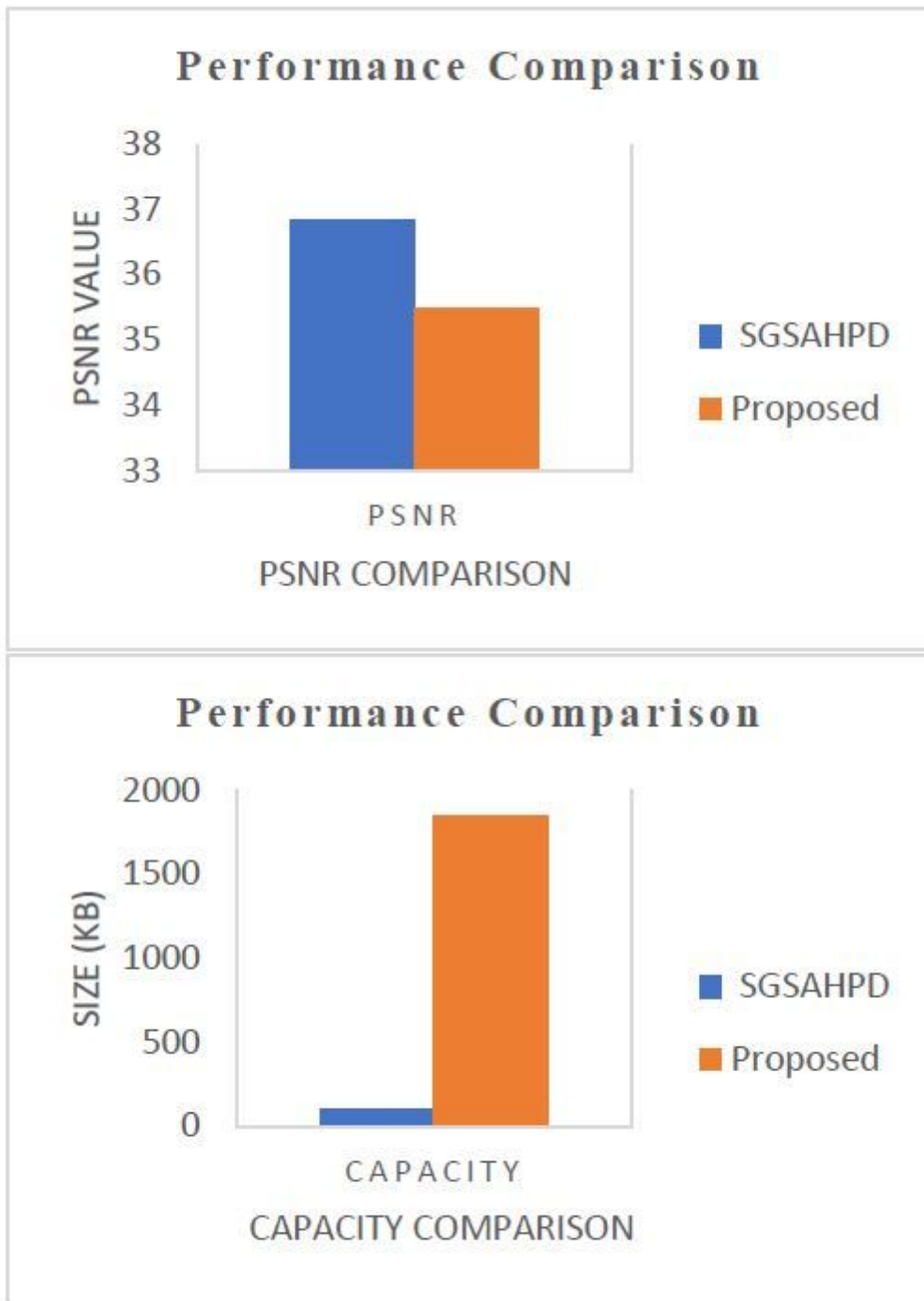
Figure 31
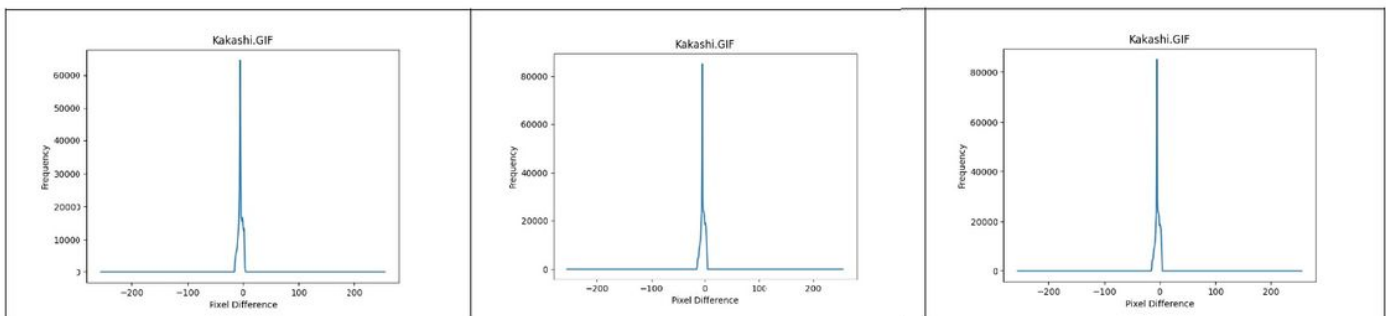
Comparison of performance using Bar graph

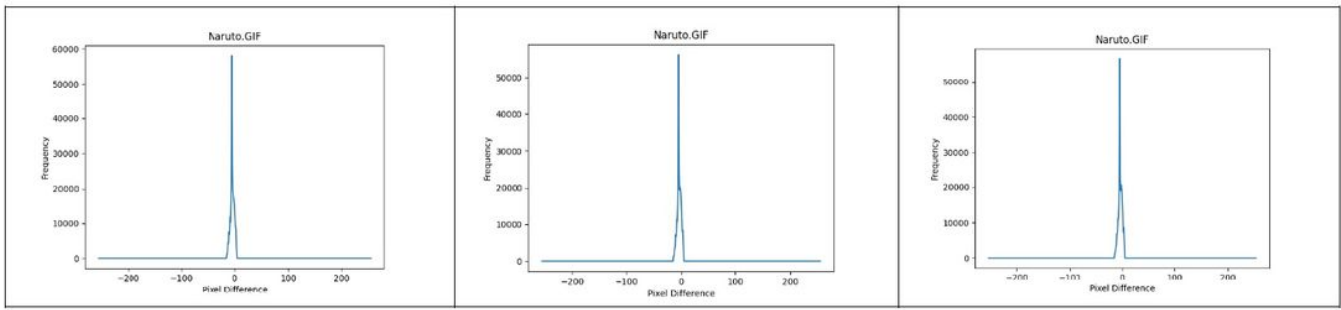**Figure 32**

PDH Analysis of Sins.gif

Figure 33
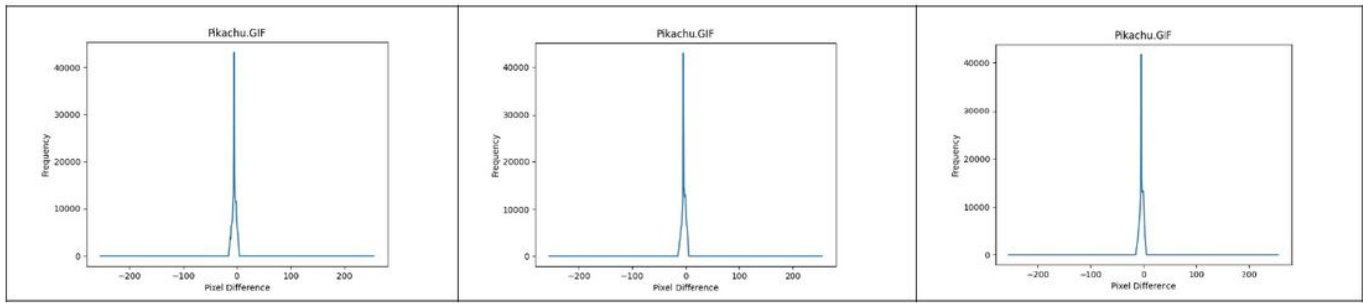
PDH Analysis of floppy.gif

Figure 34

PDH Analysis of kakashi.gif

Figure 35

PDH Analysis of naruto.gif

Figure 36

PDH Analysis of pikachu.gif