**CMSE492 Lab 3. RS Steganalysis**

03.06.2021

**Lab Task:**

1. Implement RS Steganalysis algorithm [1] in any programming language/operating system
2. Test your implementation using Seminar 25.05.2021 examples: “Consıder a 1x4 mask M=(0,1,1,0)

Consider the grayscale image, I, below having 2 rows and 8 columns:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Col1 | Col2 | Col3 | Col4 | Col5 | Col6 | Col7 | Col8 |
| Row1 | 19 | 225 | 118 | 101 | 125 | 231 | 218 | 221 |
| Row2 | 215 | 231 | 119 | 121 | 27 | 211 | 117 | 21 |

Specify 4 pixel groups, G11,..,G14, for M

Classify the groups as RM, SM, R-M, S-M, UM, U-M

Using 5% threshold for assessing RS-steganalysis statistical hypothesis (RM= R-M , SM=S-M) decide whether the image, I, has (not) a payload according to M”

1. Test your implementation on 2 host 512x512 images from [1, 2]: Lena and Mandrill-Baboon. Secret bit stream generate using a pseudo-random number generator (PRNG) provided in a programming language you use; set seed of the PRNG to some predefined value, e.g,, “345” so that each time you run the PRNG it will generate the same sequence of bits. Stream bit size shall vary from 0 to 100% of the host image pixel number according to [1, Figure 1; 2, Figure 8], with step 10%. **Use mask M=(0,1,1,0) in your implementation.**
2. **For each of the two host images calculate RM, R-M, SM, S-M for each embedding capacity from 0%, 10%, .., 100%, using 1-LSB method** **and**  **draw respective RS-diagrams (plots in the format of [1, Figure 1]). Make sure that for each host image one and the same secret bit stream is generated.**
3. **Defend the Lab on June 3, 2021, Thursday, 18.30-20.20, MS Teams, (provide your report as pdf file to Evaluator, run your program, and explain your work done).**
4. Report shall have
   1. Cover page (University, Department, Course, Semester, Year, City, Country, Lab subject, Team members, Lecturer, Lab assistant)
   2. Outline
   3. Problem definition (see items 1-4 above)
   4. RS steganalysis method description
   5. Description of RS steganalysis method implementation in your programming language/operating system
      1. Description of the host images you use and their sources
      2. Description of the secret bit stream generation including how you make possible repetition of the same secret bit stream set generation for each host image and each mask used.
      3. Description of the secret bit stream generation of the required size: 0%, 10%,…,100%
      4. Description of RM, R-M, SM, S-M calculation (in percent)
      5. Description of testing on the seminar examples (see item 2 above).
      6. Description of an 1LSB embedding method
      7. Description of how you plot RS-diagrams
      8. Description of the results obtained (2 RS-diagrams)
   6. Conclusion
   7. References
   8. Appendices with the code developed
   9. Winrar or zip file with all Lab related materials (report, images used, test results, sources, executables. It shall be possible to install your program from the CD, run it on your examples, and view results you got).

**References**

1. J. Fridrich, M. Goljan, and R. Du, Detecting LSB steganography in color and gray scale images, IEEE Multimedia, Oct.-Dec., 2001, 22-28.
2. D.-C. Wu, W.-H. Tsai, A steganographic method for images by pixel-value differencing, Pattern Recognition Letters 24 (2003) 1613–1626, <http://cmpe.emu.edu.tr/en/CourseLoad.aspx?id=CMSE492&page=lecturenotes>

**Grading policy: report – 50%, explanations – 50%**