nedeljainformatike v9.0

Tajne sakrivene u fajlovima : Steganografija

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Matematička gimnazija

14. 05. 2024.

Agenda

1. Uvod
2. Metode
3. Primene

Kriptografija

```
-----BEGIN PGP MESSAGE-----

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=6Bif
-----END PGP MESSAGE-----
```

Kriptografija

- Ne može se dekriptovati sadržaj naše poruke
- ALI neko ko nadzire kanal komunikacije može videti da je tajna poruka poslata

```
-----BEGIN PGP MESSAGE-----

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=6Bif
-----END PGP MESSAGE-----
```
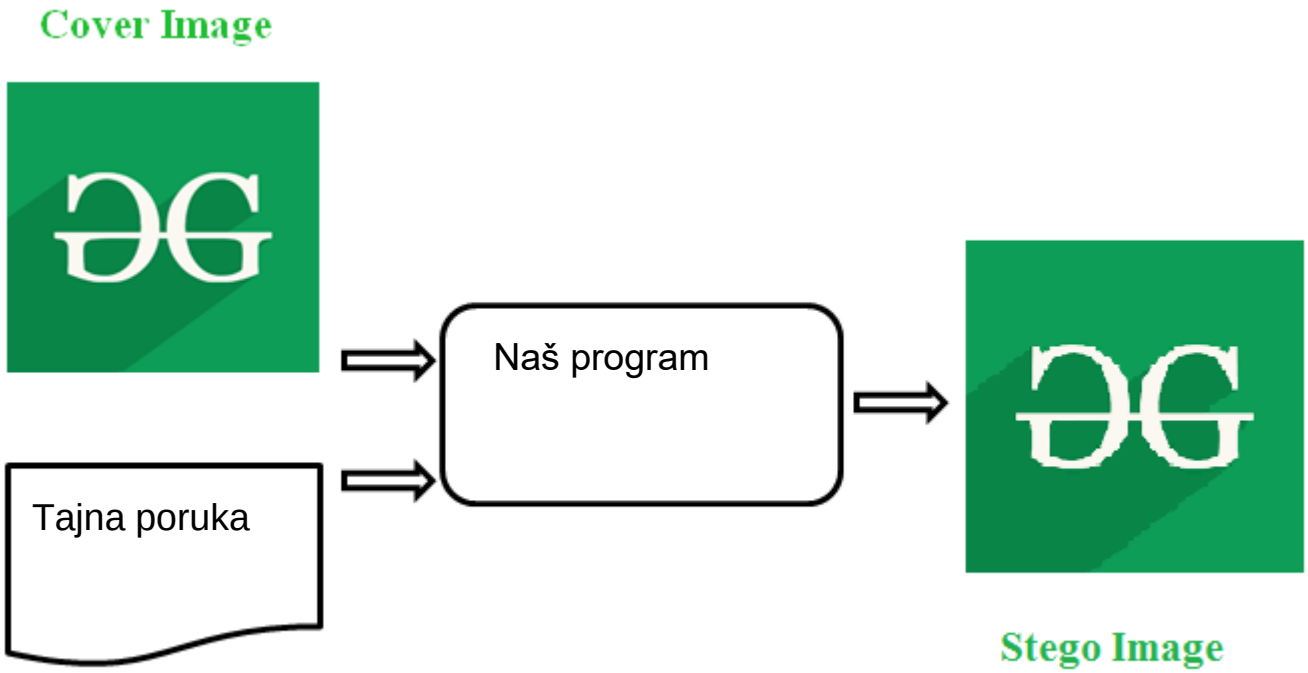

Steganografija 101



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LSB steganografija

Originalna slika

```
11111111 00000000
00000000 00000000
00000000 00000000

11111111 00000000
11111111 00000000
00000000 11111111
```

LSB steganografija u kojoj menjamo dva poslednja bita kako bi ugradili reč "cat" u našu sliku

Slika sa ugrađenom porukom

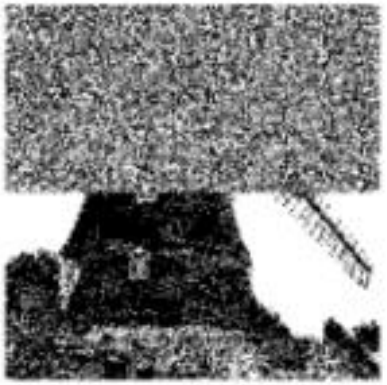
```
11111101 00000011
00000010 00000001
00000000 00000010

11111100 00000011
11111101 00000001
00000001 11111100
```

c	a	t
01 10 00 11	01 10 00 01	01 11 01 00

Steganaliza

Original

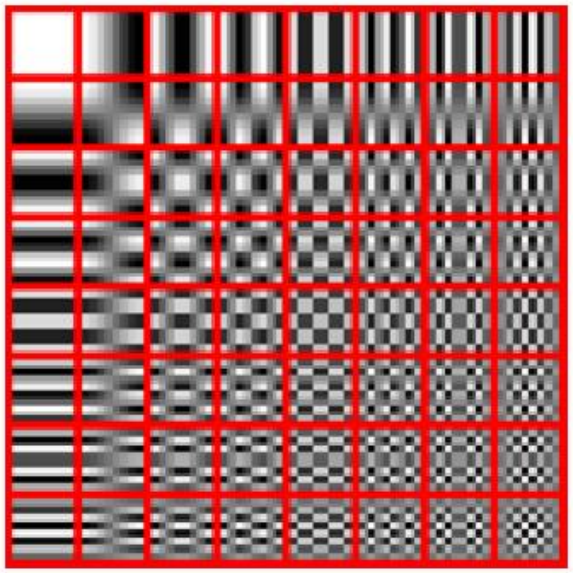
LSBs of Original



LSBs of Steganographed Version

Drugi formati slika

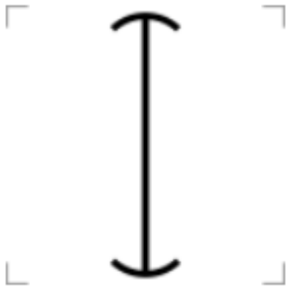
- Neki formati koriste kompresiju - na primer JPEG
- Videti predavanje sa Nedelje informatike 2022 o JPEG kompresiji
- Ne možemo koristiti LSB steganografiju
- Postoje druge metode steganografije u ovom slučaju
- Za JPEG - DCT koeficijenti



$$\begin{bmatrix} 16 & 11 & 10 & 16 & 24 & 40 & 51 & 61 \\ 12 & 12 & 14 & 19 & 26 & 58 & 60 & 55 \\ 14 & 13 & 16 & 24 & 40 & 57 & 69 & 56 \\ 14 & 17 & 22 & 29 & 51 & 87 & 80 & 62 \\ 18 & 22 & 37 & 56 & 68 & 109 & 103 & 77 \\ 24 & 35 & 55 & 64 & 81 & 104 & 113 & 92 \\ 49 & 64 & 78 & 87 & 103 & 121 & 120 & 101 \\ 72 & 92 & 95 & 98 & 112 & 100 & 103 & 99 \end{bmatrix}.$$

Steganografija u tekstu

- Unicode standard definiše dva karaktera koji se koriste u arapskom jeziku za spajanje reči - Zero width joiner i zero width non joiner
- Njih možemo iskoristiti za ugrađivanje naše tajne poruke u tekst



(а) *ISO* симбол за *ZWJ*

(б) *ISO* симбол за *ZWNJ*

Agenda

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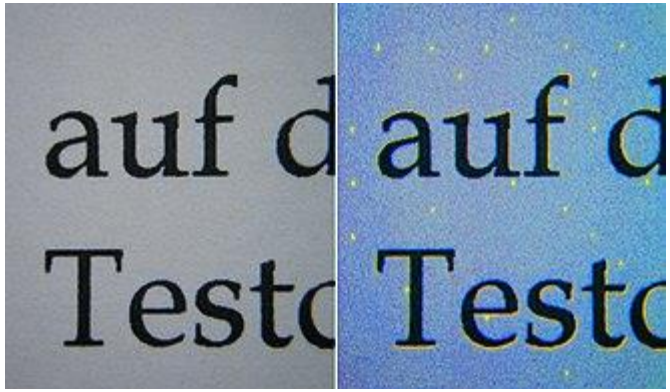
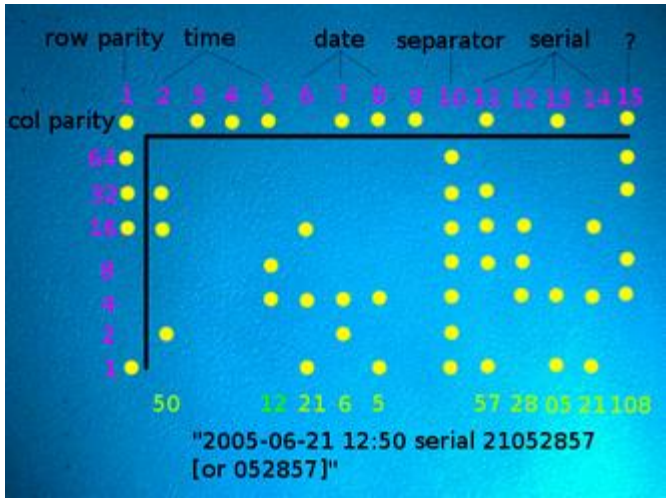
Digitalni štampači

- Štampači u svaki papir ugrađuju mikroskopske žute tačke koje služe da bi forenzički identifikovale dokument na jedinstven način
- Na ovaj način može se ukoliko dođe do potrebe identifikovati ko je odgovoran za štampanje lažnog novca, krivotvorenje dokumenata...





Watermarking i *Coded Anti Piracy*

- Watermarking predstavlja ugrađivanje poruke koja jednoznačno određuje nečije vlasništvo nad autorskim pravima digitalnog dela
- Coded Anti Piracy je tip watermarkinga pomoću kog možemo zaključiti koja osoba u lancu produkcije nekog digitalnog dela je odgovorna za širenje tog dela u širu javnost

Stegomalware

- Stegomalware predstavlja maliciozan kod ugrađen u neki fajl, koji je sakriven kako bi izbegao detekciju od strane antivirusa
- Taj maliciozni kod mora da bude aktiviran od strane nekog eksternog koda

Hvala na pažnji!

Pitanja?