CAIA (1TD396) re-exam Aug 2021

Det här är en förhandsvisning av den publicerade versionen av quizet

Startad: 2 dec kl 12.38

Instruktioner för Quiz

The re-exam in is in the form of a (ONE) quiz and it is an open book exam meaning that you can use books, notes etc. The quiz will contain different types of questions: T/F, multiple choice, numerical, motivations and explanatory. For the T/F and multiple choice questions wrong answers will result in negative points. No answer gives 0 points. You will NOT need to download images and do any real image analysis.

You have the full time (8:00-13:15) to spend on the quiz and can go back and forth between questions, **but you can only submit the quiz once!** -Similar to handing in a physical exam. The extra 15 minutes are added for submission. The system will close the submission at 13:15 sharp!

If you would like to uncheck or "un-answer" a T/F or multiple choice question- write that as a comment to one of the motivation questions. If you have a vision disability please explain in a comment to one of the motiviation questions or send me an email before you hand the exam in and I will take it into consideration.

Do not hesitate to contact me during the exam if something is unclear or if something is not working. Either through studium or directly to **ida.sintorn@it.uu.se (mailto:ida.sintorn@it.uu.se) .**

Please check announcements once in a while during the exam.

The points required for grade 3, 4, 5 are 18, 25, and 32, respectively.

Good luck!

▶ Maria

Fråga 1 **0 poäng**

Code of honor start

- [ ] I confirm that I will not seek assistance from anyone else to answer the exam questions.
- [ ] I confirm that I will not use unauthorized resources to answer the exam questions

Fråga 2

1 poäng

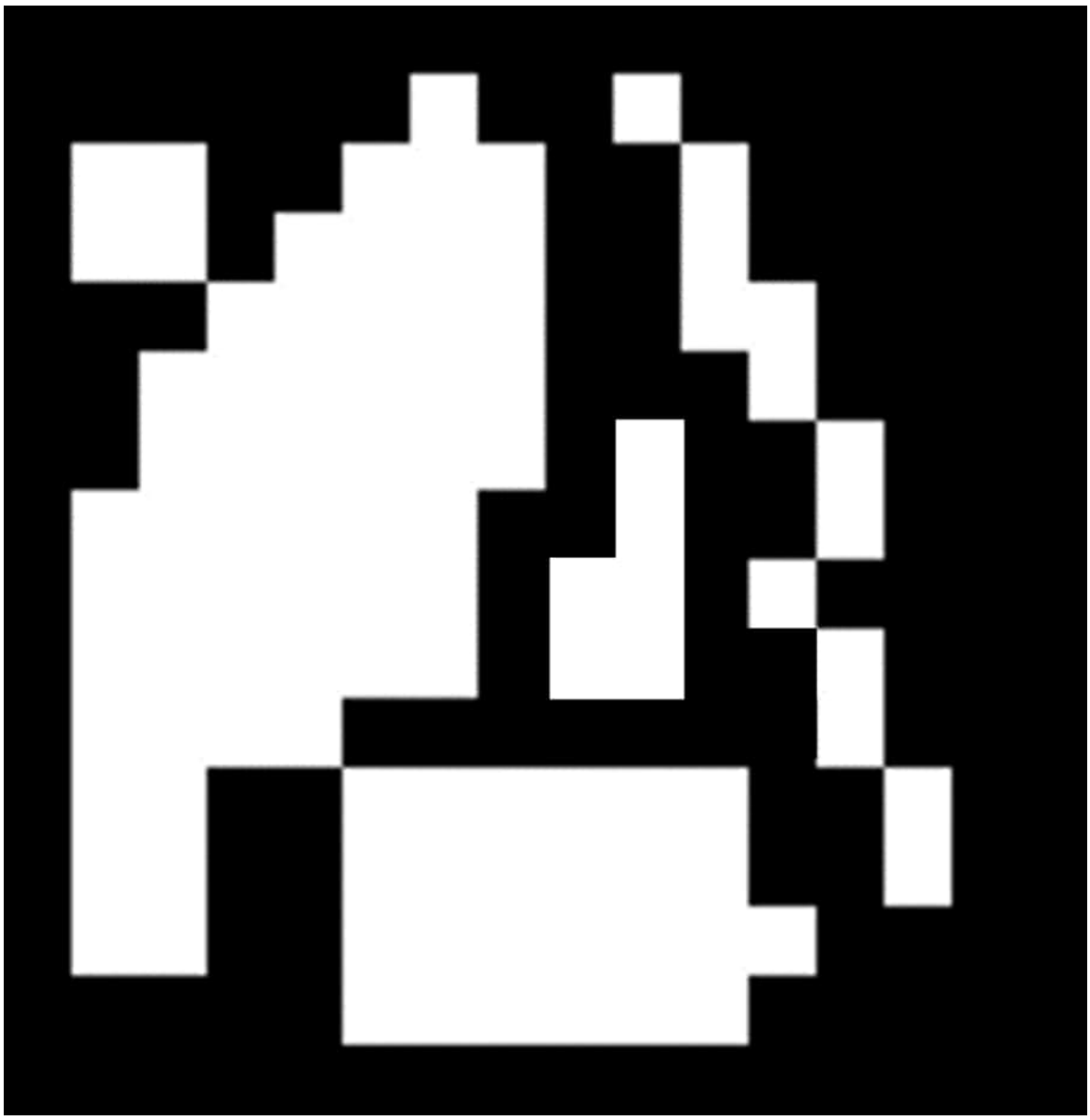
T/F? Histogram equalization always improves the visual impression of an image.

- ◯ True
- ◯ False

Fråga 3

1 poäng

How many 8-connected objects are there in the image below?



- 8
- 2
- 9
- 7
- 6
- 10
- 4
- 3
- 5

Fråga 4 — 1 poäng

T/F? Signatures shall only be used as a descriptor for convex objects.

- ◯ True
- ◯ False

Fråga 5 — 1 poäng

T/F? A gauss filter is orientation invariant.

- ◯ True
- ◯ False

Fråga 6 — 1 poäng

T/F? Intensity quantization means choosing the number of gray-levels when digitizing and image.

- ◯ True
- ◯ False

Fråga 7 — 1 poäng

T/F? To change the brightness is an example of spatial filtering.

- ◯ True
- ◯ False

Fråga 8 — 1 poäng

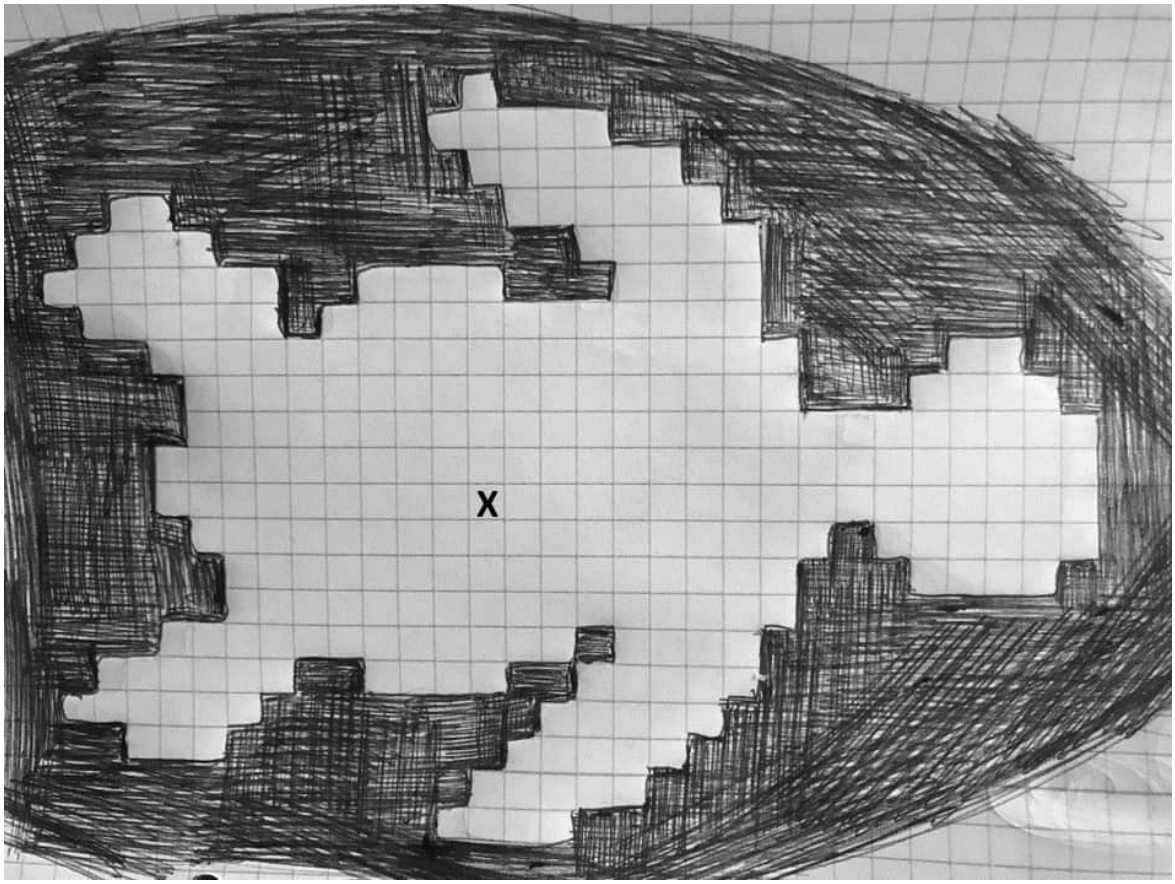
T/F? Sampling density can limit the resolution.

- ◯ True
- ◯ False

Fråga 9 — 2 poäng

What value would the marked position get with the chess-board distance transform?

▶



- ◯ 15
- ◯ 5
- ◯ 16
- ◯ 7
- ◯ 4
- ◯ 6

Fråga 10

2 poäng

In what order from left to right are the Red Green Blue color bands corresponding to the color image shown?

- ○ G, R, B
- ○ G, B, R
- ○ R, G, B
- ○ R, B, G
- ○ B, G, R
- ○ B, R, G

Fråga 11

3 poäng

Give and explain 2 different types of redundancies useful for loss-less image compression.

Redigera Visa Infoga Format Verktyg Tabell

12pt Paragraph

p 0 words </>

Fråga 12

5 poäng

Describe the following mathematical morphology operations and their effect on a binary image: erosion, dilation, opening, closing

Redigera Visa Infoga Format Verktyg Tabell

12pt Paragraph

p 0 words

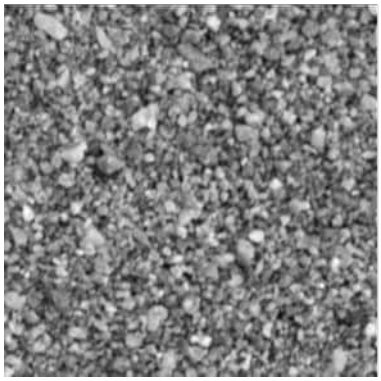
Fråga 13

3 poäng

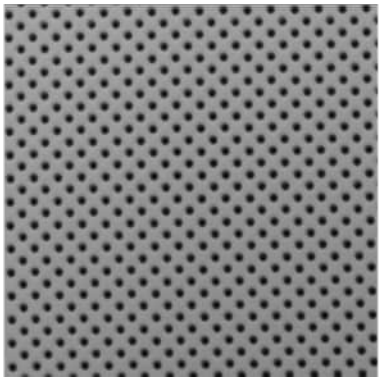
Below, three images representing different textures are shown. They images are intensity normalized to have the same mean and standard deviation.

Describe/discuss how/if histogram based measures can be used to distinguish between the textures.

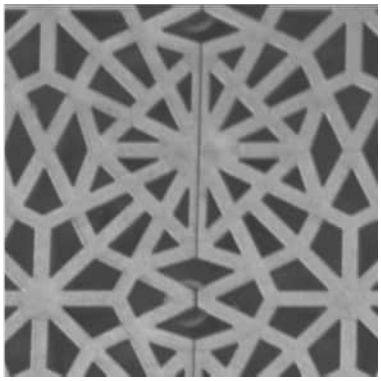
1



2



3



Redigera Visa Infoga Format Verktyg Tabell

12pt Paragraph

p 0 words </>

Fråga 14

3 poäng

Describe 2 different approaches for reducing/removing uneven background: one based on spatial filtering and one that is not.

Redigera Visa Infoga Format Verktyg Tabell

12pt Paragraph B I U A T²

p 0 words </>

Fråga 15

5 poäng

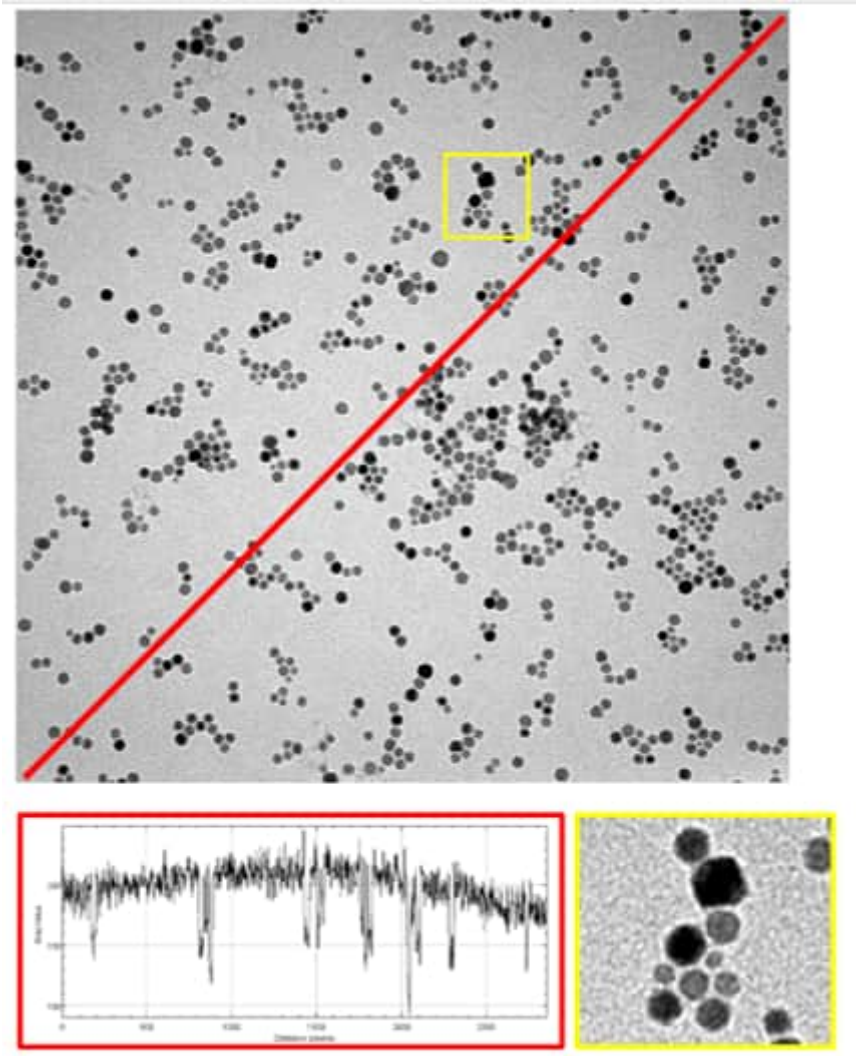
Below you see an image of nanoparticles acquired in a TEM microscope. The image is of size 2048x2048 pixels and the pixel side is 0.34nm. A plot of the intensity along the red line is also shown as well as a zoom-in of the yellow sub-image.

For an overall task of designing an image analysis "pipeline" to analyze the sizes and intensities of the nanoparticles. Describe how you would:

1) pre-process the image (noise, uneven background);

2) segment the nanoparticles and split touching/connected particles;

3) measure their sizes and intensities;



Redigera Visa Infoga Format Verktyg Tabell

12pt Paragraph

p

0 words

Fråga 16

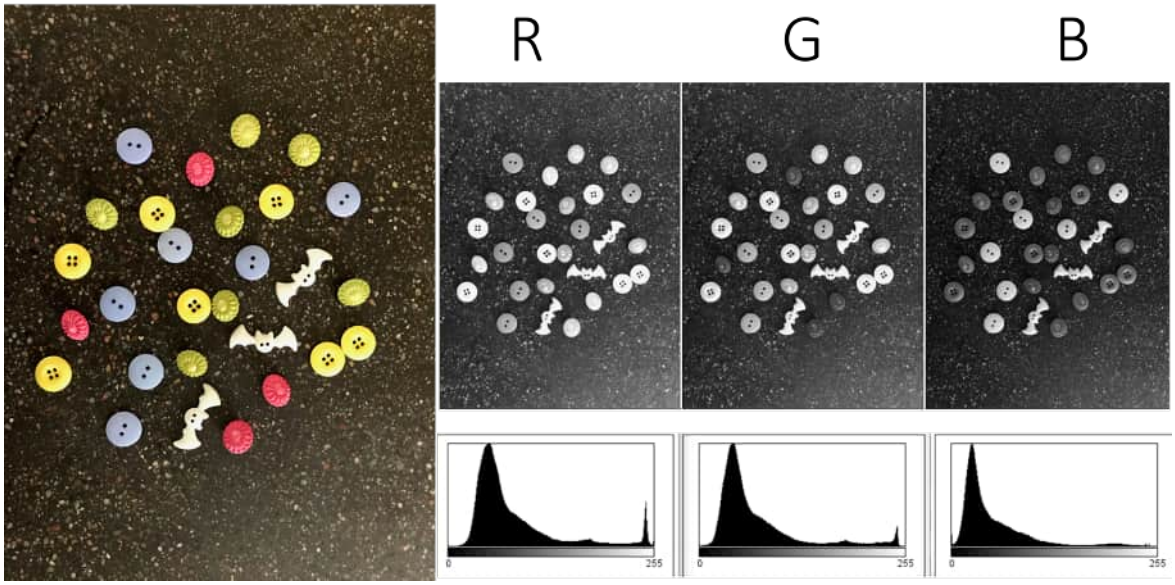
2 poäng

For the question above (about nanoparticle analysis). Is it possible to provide one quality measure (incorporating both intensity and size) for this kind of sample? Motivate your answer.

Fråga 17

5 poäng

Suggest how to detect and count the number of each type of buttons in the image below. Describe and motive the methods used, the order of applying the methods and also how you would set/choose the parameters for the methods. You can assume the image is 300 pixels in width and 400 pixels in height. The three colour bands (R,G;B) are also shown together with their corresponding grey-level histograms.



Fråga 18

3 poäng

Describe briefly the 2-class Otsu thresholding method.

Fråga 19

0 poäng

Code of honor end

- [ ] I confirm I have not used unauthorized resources to answer the exam questions.
- [ ] I confirm I have not received help from anyone else to answer the exam questions.

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Lämna in quiz