Tentamen 1TD389, 2020-12-17

⓵ Det här är en förhandsvisning av den publicerade versionen av quizet

Startad: 2 dec kl 11.21

Instruktioner för Quiz

This exam contains several multiple choice questions.

But first you are asked to upload some ID (drivers license or passport) so we know that you are the one writing the exam.

Then you are supposed to choose the correct statements only for each question.

Here is an example:

> If a question has maximum N points and there are x choices that are correct, then each correct answer awards you N/x points, while every wrong answers will reduce by N/x. But you cannot get less than zero per question!
> In other words of a questions has 6 points and 4 answers are correct then every correct answer you choose will give you 1.5p. If you do not choose a correct answer you will not get the 1.5p for that choice. But if you choose a wrong answer the total credit will be reduced by 1.5p, but you cannot get less than zero.

Please note that the questions cover the general case. There might be some special case we as teachers have not thought about, but clever students think of. What should you do then? Remember we are not clever students! We suppose the general case is the true one!

Example statement in a question: Scientific visualisations make use of computer graphics.

▶ This statement is generally true! This is what we teach in the course (the introductory lecture), since the visualisations we make in the course also make use of computer graphics. A clever student would say "no, not all visualisations make use of computer graphics, since it was not invented when Florence Nightingale made her famous visualisations". Yes, this clever student found a special case. (It could also be argued whether her visualisation was "scientific" or not) But Nevertheless, it is generally true that scientific visualisations make use of computer graphics!

Generally we have higher grade limits for the online tests, i.e. 60% for pass. But we might lover it to 50% depending on how the results turns out.

We wish you good luck and remember you could always email **anders.hast@it.uu.se (mailto:anders.hast@it.uu.se)** during the exam if something is unclear!

Fråga 1 — 0 poäng

Please upload your ID (e.g. student ID, drivers licence or passport)

Ladda upp Välj en fil

Fråga 2 4 poäng

What is true about data representation?

- [ ] "Topology" is the very same as "Geometry" (there are data representation synonyms)
- [ ] "Geometry" describes the dimensions of the object, e.g. angles and edges length
- [ ] "Topology" describes the dimensions of the object, e.g. angles and edges length
- [ ] Interpolation is always a “guess” of what the “missing" data would be like
- [ ] "Geometry" describes the form of the object, e.g. is it a triangle, rectangle
- [ ] Unstructured grids take less storage than uniform grids
- [ ] Interpolation usually gives a better representation of the sampled data
- [ ] "Topology" describes the form of the object, e.g. is it a triangle, rectangle

Fråga 3 5 poäng

What is true about visualisation?

- [ ] We can visualise more data with more than 3 dimensions thanks to Glyphs
- [ ] Visualisation is more than just pretty pictures, since it can be used as a research tool to get insight into the data
- [ ] Hans Rosling and Florence Nightingale are two examples of persons who effectively made use of visualisation to make a point, and make it understandable to others.
- [ ] 3D visualisations are always more effective than 2D visualisations

- [ ] Visualisation usually helps us understand data faster than when looking at numbers
- [ ] Visualisations never make use of computer graphics techniques.
- [ ] Glyphs are a powerful visualisation technique that helps us grasp up to 100 dimensions
- [ ] Glyph visualisations using many more than 5 dimension can be very hard to grasp

Fråga 4

4 poäng

What is true about marching techniques?

- [ ] Marching tetrahedra is aimed for 3 Dimensional data
- [ ] Marching cubes does not suffer from the ambiguity problem
- [ ] The ambiguity problem can be solved by looking at adjacent slices and draw conclusions from them
- [ ] Marching Bands can depict vortices
- [ ] Marching cubes handles bifurcations automatically without causing triangle intersections
- [ ] Marching cubes is aimed for 2 Dimensional data
- [ ] The ambiguity problem can not be solved for marching cubes
- [ ] Marching Squares produce 2D contours while marching cubes produce surfaces

Fråga 5

4 poäng

What is true about stream visualisations?

- [ ] The position of seed points will affect how streamlines will look like
- [ ] The thickness of stream tubes can depend on some variable in the data
- [ ] The colour of streamlines can depend on some variable in the data
- [ ] Colour mapping should be avoided as it confuses the visual result
- [ ] Opacity can be used to make it possible to see the data better (less occlusion), especially for streamline visualisations

- [ ] Vorticity can be depicted using stream lines
- [ ] The position of seed points will not affect how stream tubes will look like
- [ ] One way to get less occlusion is to use fewer lines or tubes (i.e. to use some kind of subsampling of the data)

Fråga 6

4 poäng

What is true about high dimensional visualisations?

- [ ] PCA can be used to reduce the dimensionality of high dimensional data
- [ ] Parallel Coordinates is useful for visualising multidimensional data
- [ ] For very high dimensional data Parallel coordinates are preferred compare to t-SNE
- [ ] t-SNE is a powerful visualisation technique for high dimensional data that projects onto 2D or 3D
- [ ] MipMap is an efficient is a powerful visualisation technique for high dimensional data that projects onto 2D
- [ ] In parallel coordinate visualisations it is preferable to have axis that correlate next to each other
- [ ] t-SNE will create clusters where similar data (data with similar features) can be found
- [ ] Usually Glyphs makes a better high dimensional visualisation than Parallel Coordinates

Fråga 7

2 poäng

In what sense do spatial encoding schemes for multiplexing of stereo images impose a limitation?

- [ ] They increase the risk for ghosting.
- [ ] They reduce effective resolution of the stereo-image.
- [ ] They lower the smallest reproducible depth difference of the stereo image.

- [ ] They lower the effective number of colors that can be reproduced in the stereo image.
- [ ] They reduce the number of display memory used for storing the stereo image.

Fråga 8

2 poäng

Creating visualizations for good stereoscopic 3D effect requires careful design of the 3D scene. Which of the following design choices in a visualization contribute to enhanced stereo sensation.

- [ ] Placing virtual objects both in viewer-space and screen-space.
- [ ] Utilizing all available screen area at maximum by using the central area and areas nearby the display border.
- [ ] Avoiding positive and negative stereo-parallax in the image at the same time.
- [ ] Maximizing contrast by maintaining different colors and illumination in the left-eye's view and the right eye's view.
- [ ] Maximizing overall image disparity by adding/preserving small detail to 3D scene objects.

Fråga 9

2 poäng

Which of the following statements is true when it comes to color as a visual variable in visualization?

- [ ] For object identification/classification tasks, the number of useful colors is very limited.
- [ ] "Color" is superior to "position" when it comes to comparative assessment of quantities.
- [ ] Human assessment of color is constant across a wide range of viewing conditions.
- [ ] Color supports qualitative tasks better than quantitative assessment tasks.
- [ ] From a perceptual point, the choice of color is independent on the size of visual marks.

Fråga 10

2 poäng

In what sense is the blend of 2D visualization elements and 3D visualization elements problematic from a perceptual point of view?

- [ ] The appearance of the same “value” or “intensity” of visualization elements might be different.
- [ ] 3D elements in a visualization occupy more screen space than 2D elements.
- [ ] Different objects of equal retinal size may be interpreted as being differently large.

Fråga 11

2 poäng

The choice of blue as a color in visualization is critical for many reasons, as explained in the lectures/slides. What is important to consider regarding the use of blue in visualizations?

- [ ] For better readability, the saturation of the chosen blue color should contrast well with background.
- [ ] Blue should be avoided in color scales for visualization of quantitative data.
- [ ] For identification/classification tasks colors, which are blends of blue and green should be avoided.
- [ ] For better readability, the lightness (or value) of the chosen blue color should contrast well with background.
- [ ] Blue is not useful for semantic/intuitive coding of visual items in a visualization.

Fråga 12

3 poäng

What is true about transparency and shadows?

- [ ] Errors from incorrect sorting during alpha blending with the OVER operator are more visible at high opacities.
- [ ] The Painter's algorithm allows us to efficiently render transparency for complex models with many triangles or layers
- [ ] Textured billboards are suitable for rendering almost any type of shape.
- [ ] Transparency is the only way to show different layers in the data
- [ ] Opacity values for data points are often stored in a texture or obtained from a transfer function

Fråga 13

3 poäng

What is true about volume rendering`

- [ ] An opacity transfer function can not be used with geometry-based rendering techniques.
- [ ] Isosurface rendering (via raycasting) is generally more expensive to render than MIP or front-to-back alpha blending, because we have to compute surface normals for shading.
- [ ] It is possible to design a general transfer function for volume rendering that works for any type of scalar data.
- [ ] The ability to interactively change isovalue is useful when exploring for example a medical CT volume.
- [ ] Direct volume rendering techniques can be implemented on graphics processing units (GPUs) that use a rasterization-based pipeline.

Fråga 14

3 poäng

What is true about vector field visualisations?

- [ ] Vector fields can be visualised by computing the so called Curl
- [ ] Vector fields can be visualised by computing the so called Promotor
- [ ] Vector fields cannot be visualised without vector glyphs

- [ ] Vector fields can be visualised by computing the so called Divergence
- [ ] Vector fields can be visualised using vector glyphs
- [ ] Vector glyphs shall never be set to have unit lengths as it leads to cluttering

Quiz sparad kl. 11.21 Lämna in quiz