College of Science – Computer Science

CSC337/CSCM37 – Data Visualization

Release Time: **09:20 Wednesday 27/05/2020 (Time Zone: BST)**

Deadline: **17:20 Wednesday 27/05/2020 (Time Zone: BST)**

Alternative Assessment Information

- This is an open-book assessment. This means you may consult your notes, textbooks, and other resources, including calculators, as you see fit.
- You must submit before the deadline. Allow some spare time for technical submission issues.
- This assessment is designed to take 2 hours to complete (maybe a little longer to account for typing speed). The deadline has been set to give you a longer window than necessary to allow you time to deal with technical issues, provide some flexibility of starting times, and to help students with disability access plans that require rest breaks and extra time.
- It is suggested that you use Microsoft Word (or any other editor of your choice) to type your answers, then save as PDF when you are ready to submit. All submitted text must be word-processed, but you may include images (or photos of hand drawn images) as part of the document.
- This is an individual assessment. Under no circumstances are you to discuss any aspect of this assessment with anyone; nor are you allowed to share this document, ideas or solutions with others using email, social media, instant messaging, websites, or any other means. Your attempts at these questions must be entirely your own work. Those found to have collaborated with others will receive a mark of 0.

Special Instructions

Answer all questions.

Submission Instructions

- Please submit a **single PDF** file **named as your student number** (e.g. 123456.pdf) via the submission link located on the module page in Blackboard/Canvas.

By submitting, electronically and/or hardcopy, you state that you fully understand and are complying with the university's policy on Academic Integrity and Academic Misconduct. The policy can be found at https://myuni.swansea.ac.uk/academic-life/academic-misconduct.

Originator(s): ***Dr. T. D. Torsney-Weir***

In case of queries email both: t.d.torsney-weir@swansea.ac.uk and berndt.muller@swansea.ac.uk

1. Identify the three inputs of the texture-based flow visualization algorithm discussed.

[3 marks]

2. Explain the importance of glyph packing when building a densely-packed glyph visualization.

[5 marks]

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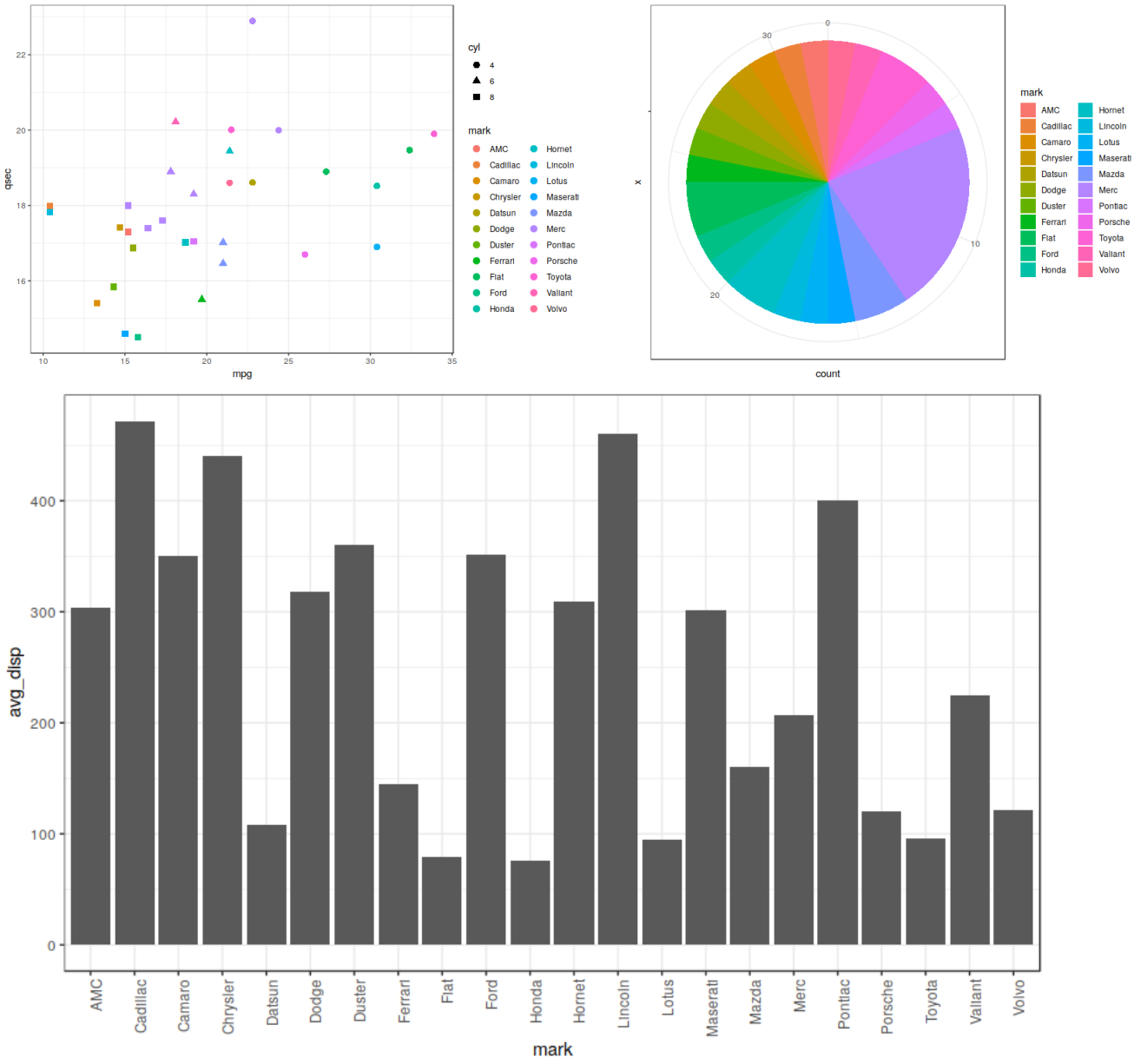

3. Answer the following questions using the visualization shown above:

   (a) List all marks used in the visualization.

   [3 marks]

   (b) List all channels used in the visualization.

   [4 marks]

   (c) Name 2 perceptual problems with the visualizations.

   [8 marks]

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4. Identify the key difference between direct and indirect volume visualization. In your comparison, give the name of one direct and one indirect volume visualization algorithm.

[8 marks]

5. Why is the streakline algorithm slower than the streamline or pathline algorithms for unsteady flow?

[4 marks]

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6. For this question you will design a transfer function for a dataset. Consider the case where you are given a new dataset, sampled on a Cartesian grid and you will visualize it using direct volume rendering.

   (a) Name 3 attributes (per voxel) of the data that your transfer function will consider.

   [3 marks]

   (b) What are the inputs and outputs of this function?

   [2 marks]

   (c) Using **pseudocode**, design a transfer function for this dataset.

   [7 marks]

   (d) Annotate your transfer function with what different sections are aiming to encode as well as your overall idea.

   [3 marks]

End of Paper