National College of Ireland

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Masters in Science in Data Analytics – Part-time – Year 2 – MSCDA2
Masters in Science in Data Analytics – Full-time – Year 1 – MSCDADJANO
Masters in Science in Data Analytics – Part-time – Year 2 – MSCDAJANO
Postgraduate Diploma in Science Data Analytics – Part-time – Year 1 – PGDSBJANO

Semester One Examinations – 2017/18

Saturday 13th January 2018
10.00am – 12.00pm

Data Visualisation (H9DV)

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Answer FOUR out of the available FIVE Questions. You will be marked on your best four answers, All questions are worth equal marks

Duration of exam: 2 hours
Attachments: n.a

1. Discuss, in your own words, two out of the following three concepts relating to the physiology and psychology of human visual processing: Aggregation, Enclosure, Relative Judgement.
   For each concept, discuss it under the following headings
   i. Provide a definition of the term (2x 2 marks)
   ii. Explain the circumstances under which it occurs (2x2.5 marks)
   iii. Describe the consequent advantages or disadvantages of this in terms of visual perception (2x3marks)
   iv. Identify and define a contrasting, but directly related concept in the same domain (e.g. Foveal vision could be contrasted with Peripheral vision) (2x2 marks)
   v. Compare and contrast the new concept you have identified in *part iv* with the original, or explain how the balance may be drawn between these two. Do not try to contrast the three points listed above. (2x3 points)

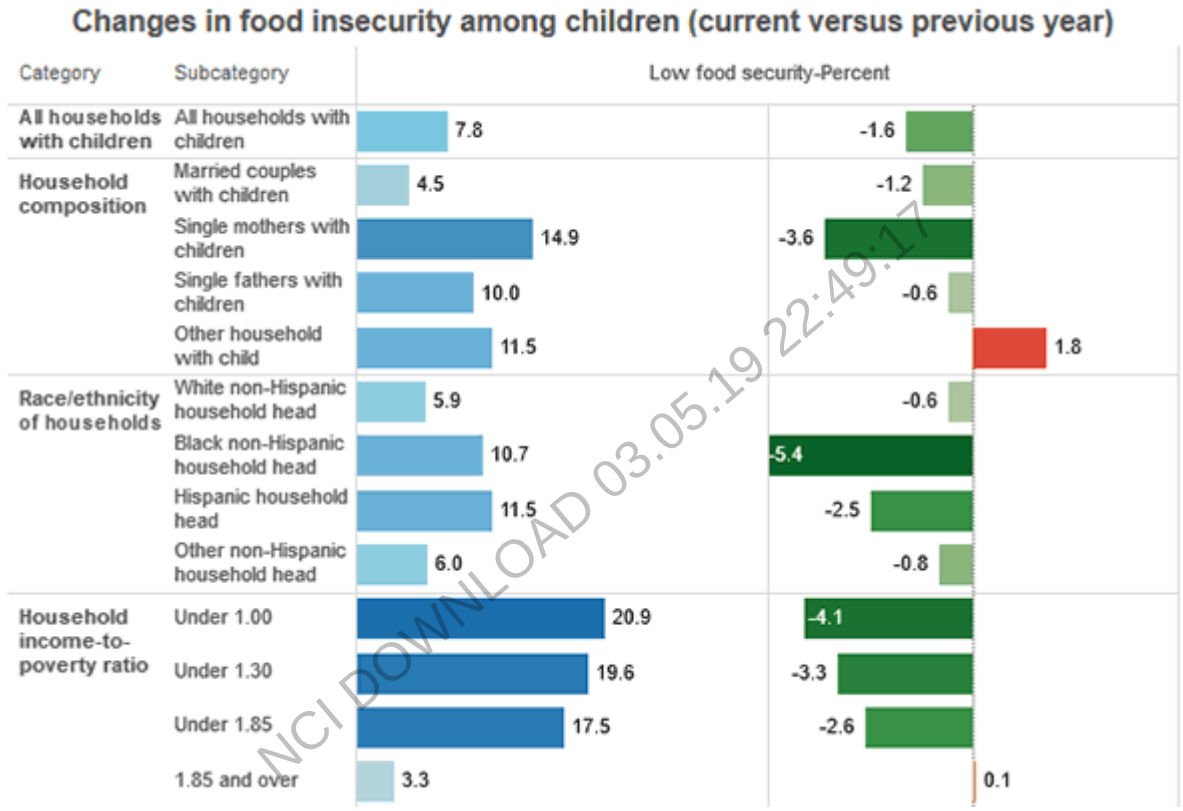
2. You are given the following input data, taken from International Olympic Council (2016) referring to the distribution of medals at the Rio 2016 Olympics.

Rank	NOC	Gold	Silver	Bronze	Total
1	**United States (USA)**	46	37	38	121
2	**Great Britain (GBR)**	27	23	17	67
3	**China (CHN)**	26	18	26	70
4	**Russia (RUS)**	19	17	19	55
5	**Germany (GER)**	17	10	15	42

Identify and describe, using the principles of visual design, preattention and affordance:
   i. The key data parameters to be represented (6 marks)
   ii. The visual variables to be used to represent each of those parameters. These should be chosen based on their suitability, which should be explained appropriately. (6 marks)
   iii. Sketch a design for how to represent the results visually: if you propose to use interactivity or temporal changes, you should describe these in text. (6 marks)
   iv. Your design should account for appropriate data associations, and describe any additional features that you would suggest for an electronic presentation of this data. (7 marks)

3. Discuss, in detail, the challenges of building testing processes for data visualization systems. You should include the following elements in your discussion, but should not be limited to just those elements.
   - Validation and verifiability
   - User testing
   - Unit testing
   - Simulations

4. You are given the following visual representation, taken from USDA, 2017. It describes the current and changes in the levels of food insecurity amongst various groups in the USA.



Discuss this representation under the following headings and others as appropriate.

i. State the visual variables used in this representation, and their association with data variables and propose an explanation for the choice of these variables (7 marks)

ii. Identify at least one important feature or trend observed in the data, and state which elements of the representation permitted this trend to be observed. Discuss whether you believe this pattern was visible clearly or preattentively. (6 marks)

iii. Propose and justify any ways in which this representation could have been made clearer using interactive elements or otherwise. (6 marks)

iv. This representation uses colour and brightness in an effective way. Critically assess how well this represents the data, with respect to any misleading interpretations it might lend its hand to. (6 marks)

5. Define, with the use of examples, each of the five following terms used in Data Visualisation. Your Answer should show an in depth understanding of the term and how it is used in the data visualisation and the data design process.

i. Change Blindness
ii. Hierarchy of Features
iii. Partial Feedback
iv. Feature and Ground
v. Technique Expert