University of Glasgow | School of Computing Science

Assessed Coursework

Course Name	**IS3**				
Coursework Number	**Assessed exercise part 1**				
Deadline	**Time:**	**4:30pm**	**Date:**	**22/11/13**	
% Contribution to final course mark	**5%**		**This should take this many hours:**	**7.5 hours**	
Solo or Group ✓	**Solo**		**Group**	✓	
Submission Instructions	**Submit through Moodle.**				
Marking Criteria	**See below**				
Please Note: This Coursework cannot be Re-Done					

Code of Assessment Rules for Coursework Submission

Deadlines for the submission of coursework which is to be formally assessed will be published in course documentation, and work which is submitted later than the deadline will be subject to penalty as set out below. The primary grade and secondary band awarded for coursework which is submitted after the published deadline will be calculated as follows:

(i) in respect of work submitted not more than five working days after the deadline
   a. the work will be assessed in the usual way;
   b. the primary grade and secondary band so determined will then be reduced by two secondary bands for each working day (or part of a working day) the work was submitted late.

(ii) work submitted more than five working days after the deadline will be awarded Grade H.

Penalties for late submission of coursework will not be imposed if good cause is established for the late submission. You should submit documents supporting good cause via MyCampus.

Penalty for non-adherence to Submission Instructions is 2 bands

You must complete an "Own Work" form via

https://webapps.dcs.gla.ac.uk/ETHICS for all coursework

UNLESS submitted via Moodle

IS3 2013-2014

Assessed exercise part 1

The aim of this exercise is for you to design a prototype visualisation system based around two data sets. This first exercise is based around Exploratory Data Analysis (EDA). There are two data sets of different styles but about the same countries:

- Olympics data set is fairly simple, and complete (no missing values)
- WHO data is more complex: has a lot of columns and also many missing values

This EDA will be gaining design requirements for the prototype you will build in the second part of the exercise. The designs you create and evaluations you perform will help you to create a solid prototype before you go on to build it. The overall aim is to make a system that lets you find and convey interesting features from the data, for example:

- Trends, correlations, highs, lows and outliers
- What features are there in the data and how strong or convincing are they?
- What metrics of finance, health, sanitation, education, etc. are good predictors of medal wins?
- If you want to be a medal-winning country, are there things you can do that at least correlate with wins?
- Show them graphically but also textually/statistically.

The labs in Week 7 will allow you try out some techniques and a report on your design is due in Week 9.

There are several stages you might go through in order to start the design of your visualisation system.

Stage 1. Data diagnostics/wrangling

Load the data, check that it looks okay, clean it up as necessary. You can do this with a spreadsheet such as Libre Office Calc or Excel. Get a feeling for the range of values and data types in the data sets. Are there outliers? Are they valid?

The medal data we have provided are pretty clean but some attributes show significant scale differences, e.g. GDP, Population, so may need some transformation/normalisation. Classify data in terms of N, O, Q Interval and Q Ratio, i.e. set out your basic dimensions and measures.

The WHO data are not so clean. Some attributes (columns) have a lot of missing values. This is not unusual in real world analysis! We can assume that the given values are correct, though. Also, some Olympic teams represent non-WHO countries and *vice versa*, so some changes and decisions have to be made if you are going to join the WHO data set with the Olympic data set—in handling missing values but also in matching up names. You could do this 'manually' in Excel or similar, or use a tool such as Data Wrangler or Google Refine.

Stage 2. Exploratory analysis

Do some exploratory analysis with different visualisation techniques to see which ones give the best views of the datasets and show you the interesting features. If you want, you can use generic tools to start exploring the data, such as Excel, Libre Office Calc and Tableau (http://www.tableausoftware.com – this one runs on Windows). In the end, though, you need to make custom tools in Java to show what you've found, or to find new things. Design it in accordance with basic principles as set out in lectures.

What questions might we ask of the data? What charts and interactions might provide insight? What are you going to roll up? What are you going to drill down into? What aggregates and similar statistical combinations are you going to make, i.e. new measures?

Within such charts/interactions, use MacKinlay's ranking of encodings as you decide how to encode your data as graphics but be aware that these rules are for static images, so there may be dynamic interactions that will show your point better, e.g. moving a slider to adjust what is highlighted in a chart, to show a trend or pattern. That's OK, but you ought to be aware that the trend or pattern will be invisible unless a person thinks to move that slider.

Medal wins may be central, initially. What can you find in terms of medal wins in absolute terms but also with respect to team size, population size, GDP, M/F balance, etc.? What other significant patterns/trends exist with data attributes other than medals? Justify your claims in your report.

Stage 3. Prototype design and evaluation

In this stage you will start to design some paper prototypes of the system you will build to visualise the data. A nice video of paper prototyping is on the Moodle page to give you some inspiration. We will bring a pack of coloured A4 paper and sticky notes, but you will have to provide any other materials: your own pens, markers, coloured paper, scissors, glue, etc.

You should also look at other visualisation tools and systems available online and see what kinds of features you might include. Remember, though, you are going to have to build this in the second part of the assessed work!

One way to do create your prototypes is for the team to break up into sub-teams and for each sub-team to generate a set of different designs. You can then pick the best ones for your final prototype. The idea is to be as creative as possible in the early stages of design, rather than fixing on one solution too early. Try to be creative, we don't just want to see Microsoft Excel again, we want something new and interesting. Be prepared to throw away designs if they do not work - that is the benefit of paper prototyping! Keep all of the different design iterations you go through so you can include images of them in the assessed exercise submission.

Don't concentrate on making well-drawn prototypes, instead think of layout and interaction between widgets and screens. Be sure to document each version of the interface and why you made changes to it. This documentation should include photos or short videos of each prototype along with the justification for changing the design.

You should evaluate your paper prototypes as you go along using Heuristic Evaluations and Think Alouds. For the heuristic evaluations you can run through Neilsen's heuristic checklist at each stage of the interaction. If there is a problem with one of the heuristics then it needs to be fixed. You can do the evaluations across sub-teams. Can the other sub-team make sense of your design?

For the Think Aloud you will do a simple user test as well as timing the task and taking field notes (on paper) of the user activity. This Think-aloud protocol is about knowing what users are thinking and not just what they are doing. Ask users to talk while performing tasks and prompt them to tell you:

- What they are thinking
- What they are trying to do
- What questions arise as they work
- The things they read
- The things they try to interact with

Make a recording or take good notes, but make sure you can tell what they were doing afterwards. Divide up your group so that you can evaluate several of the designs you have come up with. One person will be the user, attempting to answer the questions and talking through his/her actions as he/she does so (i.e. 'thinking aloud'), another will time the tasks, note the answers the user supplies to each question, and note problems and errors based both on the user's activity and the descriptions given by the user. If you have time, you can switch roles and try out the test again and compare the results. Get members of the team or members of other teams as think aloud participants and see if they can use them. Note any good or bad points, as before.

Once all of the different designs from the team have been evaluated, you should come up with one overall design that brings the best bits together. You may want to evaluate this to ensure it all works well when the different parts of joined together.

Stage 4. Hand-in your prototypes (Deadline: 22/11/13, 16:30)

You should hand in a single team report (10 pages max) for the whole group. This will be done via the IS3 Moodle page, we will give you details nearer the time. Your group report should:

- Briefly describe the data wrangling that you did to get the data into a form you could use. Describe your data classification and dimensions;
- Give an overview of your paper prototypes, the early designs and how you came to your final prototype design;
- Explain how they work;
- Report on your heuristic evaluations/think alouds, any problems you found and how you resolved them (include images or photos of the key paper prototypes that you built);
- Discuss the final version of your system;
- Make a simple video of your final prototype (video from a phone is fine) upload it to a video sharing site and include the URL in your report so we can see it in action. We are not expecting Hollywood quality, but just enough to give us an idea of how your system would work (you can get some inspiration from the paper prototyping video on the Moodle page).