CORK INSTITUTE OF TECHNOLOGY
INSTITIÚID TEICNEOLAÍOCHTA CHORCAÍ

Semester 2 Examinations 2017/18

Module Title: Interactive Data Visualisation

Module Code:	COMP8054
School:	Science & Informatics
Programme Title:	BSC in Web Development
Programme Code:	CR_KWEBD_8_Y4
External Examiner(s):	Dr Jim Buckley
Internal Examiner(s):	Dr Ruairi O'Reilly
Instructions:	Answer all questions. Q1 & Q2 are worth 35 marks each, Q3 is worth 30 marks. Answer all questions.
Duration:	2 hours
Sitting:	Summer 2018

Requirements for this examination:

Note to Candidates: Please check the Programme Title and the Module Title to ensure that you have received the correct examination paper. If in doubt please contact an Invigilator.

Question 1 – Introduction to Interactive Data Visualisation **[35 marks]**

i) What is data visualisation? [5 marks]

ii) Outline and discuss three benefits of data visualisation over alternative means of interpretation i.e. tabular data analysis (rows and columns)

[9 marks]

iii) The basic functions of most interactive visualization tools have changed little since 1996, when Ben Shneiderman of the University of Maryland first proposed a "Visual Information-Seeking Mantra": overview first, zoom and filter, then details on demand. Would you agree or disagree with this mantra? Articulate your rationale and provide examples where appropriate.

[10 marks]

iv) What are Scalar Vector Graphics? [5 marks]

v) Draw the output that is generated by the code snippet below (indicate styling using textual labels in parentheses "()"). Discuss the elements used to generate this: [6 marks]

```
<svg width="100" height="100"
xmlns="http://www.w3.org/2000/svg">

  <path d="M10 10 H 90 V 90 H 10 L 10 10"/>

  <!-- Points -->
  <circle cx="10" cy="10" r="2" fill="red"/>
  <circle cx="90" cy="90" r="2" fill="red"/>
  <circle cx="90" cy="10" r="2" fill="red"/>
  <circle cx="10" cy="90" r="2" fill="red"/>

</svg>
```

Question 2 - D3.js and data visualisation **[35 marks]**

i) D3 stands for data-driven documents. Explain what is meant by this: [5 marks]

ii) What is D3.js used for? [5 marks]

iii) The below snippets depicts a basic “Hello World” equivalent in D3. Draw a depiction of what the client will render and discuss the main statements from the code that generated it.
[7 marks]

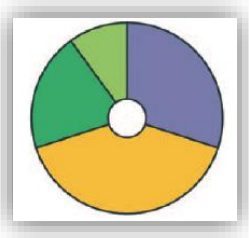
```html
<html>

  <head>
    <script src="https://d3js.org/d3.v3.min.js"></script>
  </head>

  <body>
    <div id="vizcontainer">
      <svg style="width:500px;height:500px;border:1px lightgray solid;" />
    </div>
  </body>

</html>
```

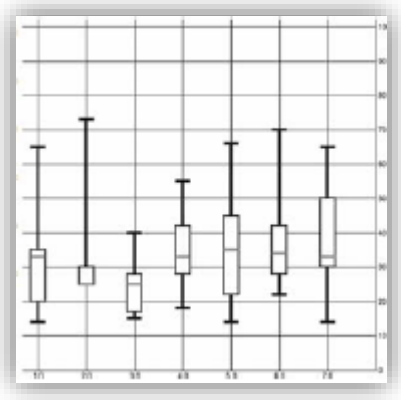
vaScript + No-Library (pure JS) ▼

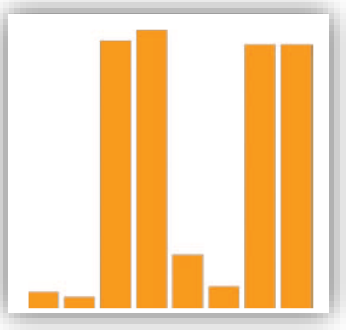
```javascript
d3.select("svg")
.append("circle")
.attr("r", 20)
.attr("cx",20)
.attr("cy",20)
.style("fill","red");
d3.select("svg")
.append("text")
.attr("id", "a")
.attr("x",20)
.attr("y",20)
.style("opacity", 0)
.text("HELLO WORLD");
d3.select("svg")
.append("circle")
.attr("r", 100)
.attr("cx",400)
.attr("cy",400)
.style("fill","lightblue");
d3.select("svg")
.append("text")
.attr("id", "b")
.attr("x",400)
.attr("y",400)
.style("opacity", 0)
.text("Uh, hi.");
d3.select("#a").transition().delay(1000).style("opacity", 1);
d3.select("#b").transition().delay(3000).style("opacity", .75);
```

iv) Identify the type of visualisations depicted, for each discuss where and when their utilisation is appropriate:

[9 marks]







v) The following is often used as a visual representation for text data. Name the visualisation, discussing the features it incorporates, where it is commonly used and its suitability as a visualisation technique.

[9 marks]

Question 3 – Data Visualisation Use Case **[30 marks]**

What a Hundred Million Calls to 311 Reveal About New York

(Note – see visualisation on following page)

"Launched in March 2003, ***311*** now fields on average more than 50,000 calls a day, offering information about more than 3,600 topics: school closings, recycling rules, homeless shelters, park events, pothole repairs. The service has translators on call to handle some 180 different languages. City officials tout a 2008 customer satisfaction survey, conducted by an outside firm, that compared 311's popularity to other call centers in both the public and private sectors. 311 finished first, barely edging out hotel and retail performance but beating other government call centers, like the IRS's, by a mile. (At the very bottom of the list, not surprisingly: cable companies.) Executive director Joseph Morrisroe attributes 311's stellar scores to its advanced technology, relentless focus on metrics, and employee training, which ensures that "customers will speak with a polite, professional, and knowledgeable New Yorker when they need assistance."

If anyone still wondered whether the 311 concept was here to stay, New York's 100 millionth call should have dispelled all doubts. So, for that matter, should the other 300-plus public call centers now in operation across the US. For millions of Americans, dialing 311 has become almost as automatic as 411 or 911. But—as New York learned in the maple syrup incident—the hundreds of millions of calls also represent a huge pool of data to be collected, parsed, and transformed into usable intelligence. Perhaps even more exciting is the new ecosystem of startups, inspired by New York's success and empowered by 21st-century technology, that has emerged to create innovative ways for residents to document their problems. All this meticulous urban analysis points the way toward a larger, and potentially revolutionary, development: the city built of data, the crowdsourced metropolis."

i) Identify and discuss the underlying data visualisation technique and principles being employed.

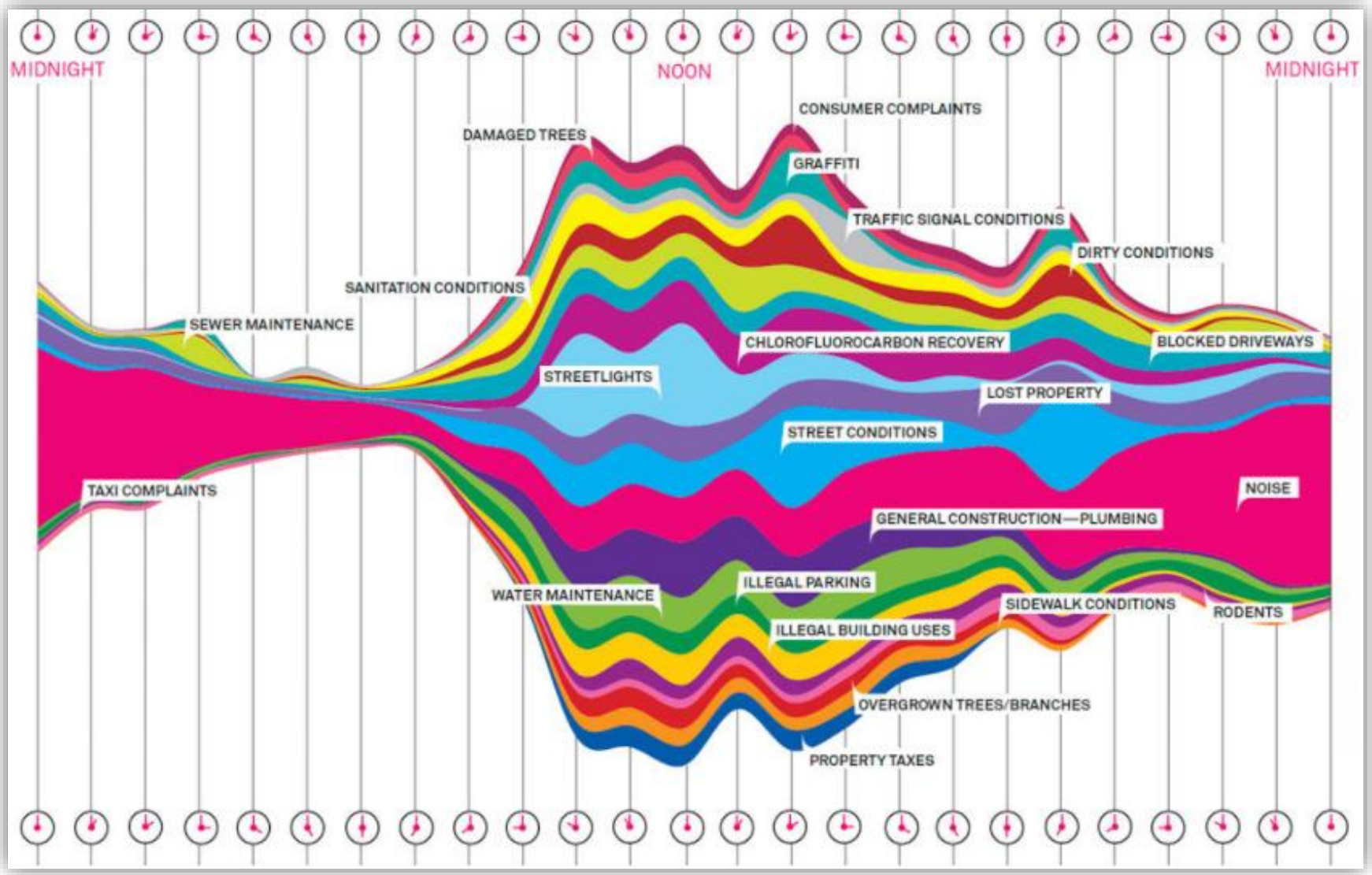
[10 marks]

ii) Appraise the suitability of the visualisation technique for the web. [7 marks]

iii) How is the data visualisation technique being applied to its data source. [5 marks]

iv) What interactive functionality, if any, could be incorporated into this visualisation technique? Evaluate its suitability or unsuitability.

[8 marks]


MIDNIGHT
NOON
MIDNIGHT
CONSUMER COMPLAINTS
DAMAGED TREES
GRAFFITI
TRAFFIC SIGNAL CONDITIONS
DIRTY CONDITIONS
SANITATION CONDITIONS
SEWER MAINTENANCE
CHLOROFLUOROCARBON RECOVERY
BLOCKED DRIVEWAYS
STREETLIGHTS
LOST PROPERTY
STREET CONDITIONS
TAXI COMPLAINTS
NOISE
GENERAL CONSTRUCTION—PLUMBING
ILLEGAL PARKING
WATER MAINTENANCE
SIDEWALK CONDITIONS
RODENTS
ILLEGAL BUILDING USES
OVERGROWN TREES/BRANCHES
PROPERTY TAXES

Silence Please

Do not turn over this question paper until advised to do so by the invigilator.

Then check that it is the correct course code and title for the examination that you are sitting

Write lecturer's name and course code on top of front cover of answer book