

Coursework 2: Understanding Data

Brief

Due date: Wednesday 22th March 2017, 16:00.

Handin: 1617/COMP6237/3/ (<http://handin.ecs.soton.ac.uk/handin/1617/COMP6237/3/>)

Required files: report.pdf

Data: gap-html.zip (<https://secure.ecs.soton.ac.uk/notes/comp6237/data/gap-html.zip>)

Credit: 20% of overall module mark

Overview

In this coursework you need to perform exploratory/descriptive data mining on a data set that we provide. You will need to write scripts to parse the data into a usable format, perform some kind of feature extraction and then apply standard techniques to explore relationships between data items, such as K-Means and Hierarchical Clustering, and data-analytic visualisation techniques like Multidimensional Scaling. Finally you need to put together a report that details your approach and your findings.

Details

The data you will be using for this assignment is a set of 24 texts about Antiquity (both classical and secondary literature); the original books have been scanned and run through an Optical Character Recognition system to produce an HTML document for each page. The scans and OCR data were produced by Google as part of the Google Books Library Project (https://en.wikipedia.org/wiki/Google_Books_Library_Project). A typical scanned page and its OCR result is shown below:

CONTENTS.—BOOK I.

racter of Galba. L. *Vitellius*, before Galba's death, aims at the sovereignty. LI. Origin of the revolt among the German legions. *Vitellius* saluted emperor. He sends two armies to invade Italy, one under *Fabius Valens*, and the other under *Cæcina*. *Vitellius* follows with a third army. His excessive luxury and stupidity. The cruelty and rapine of *Valens* and *Cæcina*. LXIII. The Gauls, partly through fear and partly from inclination, swear fidelity to *Vitellius*. LXIV. *Valens* on his march hears of the death of Galba. LXVII. *Cæcina* attacks the *Helvetians*, and lays waste the country. He passes over the *Penine mountains* into Italy. LXXI. *Otho's* conduct at Rome: he begins to act with vigour. LXXII. Death of *Tigellinus*, and his character. LXXIV. Letters between *Otho* and *Vitellius*: they endeavour to over-reach each other. Emissaries employed by both. The people of *Sarmatia* invade the province of *Mæsia*, and are put to the rout with great slaughter. LXXX. An insurrection of the soldiers at Rome. LXXXIII. *Otho's* speech to the soldiers. LXXXVI. Portents and prodigies spread a general alarm at Rome. LXXXVII. *Otho* consults about the operations of the war: he appoints his generals, and sends his fleet to invade the *Narbon Gaul*. LXXXIX. Melancholy condition of the people at Rome. *Otho* proceeds on his expedition against the *Vitellian* forces, and leaves his brother, *Salvius Titianus*, chief governor of Rome.

These transactions passed in a few months.

Years of Rome—Christ	Of	Consuls.
822	69	<i>Servius Galba</i> , 2d time, <i>Titus Vinius Rufinus</i> .

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You can download the a Zip file containing the HTML pages with the OCR results here (<https://secure.ecs.soton.ac.uk/notes/comp6237/data/gap-html.zip>) . Inside the zip file, there are 24 folders representing the 24 texts, with each page represented by the sequentially numbered HTML files. We haven't included the original scanned images due to their size (around 4GB), however, you can browse the original scans here (<https://secure.ecs.soton.ac.uk/notes/comp6237/data/gap-images/>) if you wish.

The aim of this coursework is for you to explore how these 24 texts are related by applying appropriate data mining techniques. You'll need to create software to extract the contents of the HTML files and build some form of feature representation to which you can apply standard descriptive data mining techniques. At a minimum, we're expecting you to experiment with Hierarchical Clustering and Multi-Dimensional Scaling, however you might also explore other approaches.

Deliverable

You need to produce a concise 2-page "working notes" paper (see <http://ceur-ws.org/Vol-1043/> (<http://ceur-ws.org/Vol-1043/>) for examples of standard academic working notes papers) using the standard 2017 ACM conference proceedings style (<https://www.acm.org/publications/proceedings-template>) (use the sigconf style option for the template). The two page limit on the paper is final; no additional pages or appendices are permitted. We're expecting the paper to illustrate what you have done and also demonstrate your ability to interpret what the data mining techniques are showing.

Marking and Feedback

Full details of the marking scheme are given below:

Learning Outcomes

- Solve real-world data-mining, data-indexing and information extraction tasks
- Demonstrate knowledge and understanding of:
 - Key concepts, tools and approaches for data mining on complex unstructured data sets
 - Theoretical concepts and the motivations behind different data-mining approaches

Mark Scheme

Good working notes papers not only effectively apply techniques and describe results, but also offer critical insight into the findings of the analysis in the context of the underlying data. In particular you need to demonstrate that you understand the data, and, in the context of that understanding, that you can rationalise and reflect on why the analytic techniques are giving the results they do. The working notes paper will be marked using the following criteria:

Criterion	Description	Marks
Experimentation	Analyse the problem and define suitable preprocessing and feature extraction operations	28
Application of techniques	Show ability to apply exploratory data mining techniques	28
Analysis	Reflection on what can be understood from the data through the application of exploratory techniques	28
Reporting	Clear and professional reporting	16

Standard ECS late submission penalties apply.

Written individual feedback will be given covering the above points, and will be emailed out once marking is complete. We'll also use one of the lecture slots for a further group feedback as well as a discussion about the data and the analysis.

Tools

You can use any available existing tools, programming environments and software libraries for this coursework. It is however important that you include full details in your report - this must include specific details about which specific variant of the standard techniques are being used, with references as appropriate. Also include any details of the implementation doing something non-standard (for example making approximations in the sake of efficiency), and all parameters.

Questions

If you have any problems/questions then email (<mailto:jsh2@ecs.soton.ac.uk>) or speak to Jon (<http://ecs.soton.ac.uk/people/jsh2>) in his office or after the lectures.