RESEARCH JOURNAL — COMPUTING

Version 2.0
BSc Computing for Games
COMP110

Dr Ed Powley

Introduction

In this assignment, you will produce a journal detailing your research on the principles of computing. Your research will focus on a seminal paper in computing, exploring the historical context of the paper and its lasting influence on the field.

Familiarity with the scientific literature is extremely helpful for the computing professional, both to understand the seminal works that lay the foundations of the field, and to keep abreast of recent developments at the cutting edge. Games technology is a fast-moving field, and keeping up is important. However scientific papers are written in a way that is sometimes daunting to newcomers, so it is essential to practice the skill of reading and comprehending such papers. Keeping a research journal is a useful way to record your thoughts (questions, hypotheses, connections, ideas, ...) as you explore the literature.

"Computer science is not about machines, in the same way that astronomy is not about telescopes. There is an essential unity of mathematics and computer science."

— Michael R. Fellows

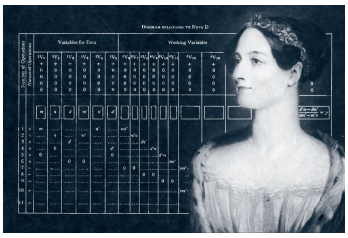
This assignment is formed of several parts:

(A) **Write** a draft research journal, of at most 1500 words, that will:
  (i) **summarise** the key contributions of **one** of the papers listed below;
  (ii) **discuss** the context and influence of your chosen paper, with reference to other papers from the scientific literature;
  (iii) **list** the papers referenced, including the chosen paper, in the form of a correctly formatted bibliography in ACM or IEEE style.

(B) **Write** the final version of your research journal, of at most 1500 words, that will:
  (i) **revise** any issues raised by your tutor and/or your peers following Part A.

(C) **Discuss** your research journal with the tutor in the timetabled viva session.

Assignment Setup



Ada Lovelace is considered by some to be the first ever programmer. Lovelace believed that intuition and imagination were critical to effectively applying mathematical and scientific concepts. She valued metaphysics as much as mathematics, viewing both as tools for exploring "the unseen worlds around us".

This assignment is an **academic writing task**. Fork the GitHub repository at the following URL:

`https://github.com/Falmouth-Games-Academy/comp110-journal`

Use the existing directory structure and, as required, extend this structure with sub-directories. Please also ensure that you add any editor-specific files and folders to the `.gitignore` file.

Part A

Part A consists of a **single formative submission**. This work is **individual** and will be assessed on a **threshold** basis.

To complete Part A, read the papers listed below. Choose **one** of these papers to focus on for your research journal. Use this paper as a starting point for

further reading in the scientific literature. Write a 1500 word document, typeset using LaTeX, which summarises your chosen paper and its influence on the field of computing with reference to the other papers you have read. Your report must include a bibliography of all works cited; it is recommended that you typeset this using BibTeX with the `IEEEtran` package.

Commit your work to your GitHub repository regularly. Bring a draft of your research journal to the timetabled review session, where it will be reviewed by your peers. You may also request feedback from the tutor at any time, by opening a pull request on GitHub.

You will receive **immediate informal feedback**.

Part B

Part B is a **single summative submission**. This work is **individual** and will be assessed on a **criterion-referenced** basis using the criteria listed in the marking rubric at the end of this document.

To complete Part B, revise your report from Part A to take into account any feedback you have received so far.

Upload the compiled `.pdf` version of your journal to LearningSpace. Note that LearningSpace will only accept a single `.pdf` file. Please check the `.pdf` file carefully for errors before submission.

You will receive **formal feedback** three weeks after the final deadline.

Part C

Part C consists of a **single formative submission**. This work is **individual** and will be assessed on a **threshold** basis.

To complete Part C, bring the final version of your research journal to the timetabled viva session. Be ready to discuss your work with the tutor.

You will receive **immediate informal feedback**.

Additional Guidance

The papers listed below are widely regarded as seminal works in the field of computer science. As with all papers, they were influenced by work that came before, and have influenced work that came after. They are decades old, but all of them have played a significant role in shaping the state of computing in 2017. Your task is to develop an understanding of *why* these papers are seminal: how they fit into the context of what came before, what they contributed to the state-of-the-art at the time they were published, and how they have gone on to influence subsequent thinking in the field.

As much as possible you should focus your reading on peer-reviewed scholarly sources reporting primary research: articles in scientific workshops, conferences, journals, and some books or book chapters. Other sources tend to be less rigorous, and should be used only for background information or in cases where their use can be convincingly justified. It is almost never appropriate to cite Wikipedia and other similar online sources, although these are often useful for identifying further scholarly works.

A common pitfall is to focus too much on summarising the content of the papers you have read. For higher marks you need to demonstrate **insight** into what you have read: forming inferences and analyses beyond what is written in the paper. Some questions you might ask yourself are: Why is the paper significant and/or influential? What is the problem it is trying to solve, and why

is that problem important? Why did the researchers choose the approach that they did? Is there anything counterintuitive or surprising in the paper? Do you disagree with any of the assumptions or claims it makes? Does the paper suggest any further research questions?

A related pitfall is to structure the journal as a sequence of disconnected entries. Instead aim to **synthesise** multiple papers into a cohesive argument, drawing connections between works by different authors. Understanding individual works is useful, but forming a holistic picture is much more valuable.

Most researchers write scientific papers for the intended audience of their fellow researchers. Thus some papers can seem impenetrable to the novice reader. Don't lose heart! Discuss the paper with your peers. Follow up the papers it cites to find alternative explanations. If all else fails, continue reading the paper — often a difficult paragraph is clarified by something which appears later.

FAQ

- **What is the deadline for this assignment?**
  Falmouth University policy states that deadlines must only be specified on the MyFalmouth system.
- **What should I do to seek help?**
  You can email your tutor for informal clarifications. For informal feedback, make a pull request on GitHub.
- **Is this a mistake?**
  If you have discovered an issue with the brief itself, the source files are available at:
  `https://github.com/Falmouth-Games-Academy/bsc-assignment-briefs`.
  Please make a pull request and comment accordingly.

Reading list

You must choose **one** of the following papers on which to focus your research journal. However it is recommended that you read all of them before making your choice.

E. W. Dijkstra, "Go to statement considered harmful," *Communications of the ACM*, vol. 11, no. 3, pp. 147–148, 1968.

E. G. Gilbert, D. W. Johnson, and S. S. Keerthi, "A fast procedure for computing the distance between complex objects in three-dimensional space," *IEEE Journal on Robotics and Automation*, vol. 4, no. 2, pp. 193–203, 1988.

D. E. Knuth and R. W. Moore, "An analysis of alpha-beta pruning," *Artificial Intelligence*, vol. 6, pp. 293–326, 1975.

B. T. Phong, "Illumination for computer generated pictures," *Communications of the ACM*, vol. 18, no. 6, pp. 311–317, 1975.

R. L. Rivest, A. Shamir, and L. Adleman, "A method for obtaining digital signatures and public-key cryptosystems," *Communications of the ACM*, vol. 21, no. 2, pp. 120–126, 1978.

A. M. Turing, "Computing machinery and intelligence," *Mind*, vol. 59, pp. 433–460, 1950.

Marking Rubric

Criterion	Weight	Refer for Resubmission	Basic Competency	Basic Proficiency	Novice Competency	Novice Proficiency	Professional Competency
Basic Competency Threshold	40%	At least one part is missing or is unsatisfactory.	The student participated in the peer review activity, with enough work available to allow a meaningful review. The student gave a meaningful review of at least one peer's work. The student participated in the viva, with enough work available to hold a meaningful discussion. Sources have been cited in an appropriate manner, without any obvious errors. There are no breaches of academic integrity.				
Breadth of reading	10%	None of the articles listed above are referenced. Fewer than 2 additional sources, not listed above, are referenced.	One of the articles listed above is referenced. An additional 2 sources, not listed above, are referenced.	One of the articles listed above is referenced. An additional 5 sources, not listed above, are referenced.	One of the articles listed above is referenced. An additional 8 sources, not listed above, are referenced.	One of the articles listed above is referenced. An additional 12 sources, not listed above, are referenced.	One of the articles listed above is referenced. An additional 16 sources, not listed above, are referenced.
Depth of insight	15%	No insight is demonstrated. Papers are merely paraphrased.	Little insight is demonstrated. Papers are summarised in the student's own words.	Some insight is demonstrated. Attempts are made at discussion beyond summary.	Much insight is demonstrated. Discussion is inferential in nature.	Considerable insight is demonstrated. Discussion is analytical in nature.	Significant insight is demonstrated. Discussion is analytical and evaluative in nature.
Specificity, verifiability & accuracy of claims	10%	No citations to evidence to claims. Substantial errors and/or misinterpretations.	Few claims have a clear source of evidence. Significant errors and/or misinterpretations.	Some claims have a clear source of evidence. Many errors and/or misinterpretations.	Many claims have a clear source of evidence. Some errors and/or misinterpretations.	Most claims have a clear source of evidence. Few errors and/or misinterpretations.	All claims have a clear source of evidence. Almost no errors and/or misinterpretations.
Synthesis	15%	No attempt has been made to synthesise information from multiple sources.	A superficial attempt has been made to synthesise information from multiple sources.	A reasonable attempt has been made to synthesise information from multiple sources.	Information from multiple sources is synthesised into a somewhat cohesive whole.	Information from multiple sources is synthesised into a cohesive whole. Connections are analytical in nature.	Information from multiple sources is synthesised into a strongly cohesive whole. Connections are analytical and evaluative in nature.
Spelling & grammar	5%	Substantial spelling and/or grammatical errors.	Many spelling and/or grammatical errors.	Some spelling and/or grammatical errors.	Few spelling and/or grammatical errors.	Almost no spelling and/or grammatical errors.	No spelling or grammatical errors.
Structure	5%	There is no structure, or the structure is unclear.	There is little structure.	There is some structure. A few sentences and paragraphs are well constructed.	There is much structure. Some sentences and paragraphs are well constructed.	There is much structure, highlighting the key themes. Most sentences and paragraphs are well constructed.	There is much structure, highlighting the key themes. All sentences and paragraphs are well constructed.