

Jacob Chalk

Mobile: 07899346230 | Email: jacob_chalkie_@hotmail.co.uk | LinkedIn: <https://www.linkedin.com/in/jacob-chalk/> | Website: <https://jacobchalk.github.io/>

Profile

A driven, hardworking individual, recently graduating from the University of Bristol with a First-Class Honours MEng Computer Science degree and now currently studying to complete a PhD in Computer Science. I have experience in teaching assistance, working in software development teams, and conducting research. Express a strong passion for my subject and received the Netcraft prize for top 5 third year MEng Computer Science students. Currently, my PhD research is focused on employing specific architectures to help leverage information between audio and video modalities to improve classification results.

Achievements

In academic 2019/20 year I earned the Netcraft prize for the top 5 Third Year MEng Computer Science/Computer Science with Maths, due to exceptional academic performance.

The following year I graduated with First Class Honours from MEng Computer Science at the University of Bristol, scoring highly (83) with my thesis: "Video GANs for Human-Object Interactions".

Experience

HPT Teaching Assistant

Part-time teaching assistant for the following modules in Computer Science:

Second Year Module - Software Product Engineering (September 2019 – June 2021)

- Mentor two student development teams
- Offer advice and potential solutions towards issues that the team may face
- Organise biweekly meetings to monitor progress, team harmony and interaction with their client
- Ensure the team are following the correct development process: Test Driven Development, Continuous Integration, Issue Tracking, and other relevant processes

Third Year Module - Computer Graphics (October 2020 – January 2021)

- Assist students in weekly timetabled lab slots
- Guide students towards solutions on issues they are stuck on, while encouraging them to gain a better understanding of the concept/underlying maths so that they can translate it to code

Third Year Module – Games Project (February 2021 – June 2021)

- Mentor two student development teams
- Offer advice and potential solutions towards issues that the team may face
- Provide feedback to the marking panel to comment on the team's development to aid in their marking process

Fourth Year Module – Applied Deep Learning (October 2021 – January 2022)

- Assist students in weekly timetabled lab slots
 - Guide students towards solutions on issues they are stuck on, while encouraging them to gain a better understanding of the concept/underlying maths so that they can translate it to code
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Education

2021 – 2025 University of Bristol: PhD Computer Vision:

First Year:

Currently, I am in my first year of my PhD. My current research involves working with multi-modal data, specifically, utilising a perceiver-style architecture to leverage information between the two modalities in audio-visual data to improve classification results.

2017 – 2021 University of Bristol: (MEng – 1st Class) Computer Science:

Fourth Year:

During the fourth year, I undertook a research project titled "Video GANs for Human-Object Interactions". This was motivated by the potential to utilise a Generative Adversarial Network to help resolve imbalances in video datasets. Specifically, it aimed to generate videos in a zero-shot setting and was trained on the EPIC-KITCHENS-100 dataset and attempted to do this through the means of a re-implementation of HOI-GAN. This project gave me a deep and extensive view into the world of generative models and was an incredibly rewarding experience. During this year, I was a teaching assistant for the second-year module: Software Product Engineering and the third-year modules: Computer Graphics and the Games Project.

Third Year:

In third year, I managed to perform very well academically, achieving firsts across all modules I studied, with my most notable grades being: 90% in Computer Graphics, 84% in Computational Neuroscience, 81% in Image Processing and Computer Vision and 81% in Machine learning. This then allowed me to receive the Netcraft prize for the top 5 third year MEng Computer Science/Computer Science with Maths students, with a final overall average of 79% across all modules.

MEng Thesis

Video GANs for Human-Object Interactions:

This was my fourth year and final university project. This project focused on employing Conditional Generative Adversarial Networks (CGANs), as a sophisticated sampling method to generate instances of classes that have not been seen during training (zero-shot learning). Specifically, it focussed on the domain of video generation, as this is significantly lacking in comparison to image generation, as the introduction of the temporal dimension poses extra challenges. Furthering this, it focussed specifically on videos of human-object interactions, where a human participant is performing a singular, unscripted action on a singular primary object, within different environments. These videos depict: dense, stochastic, and non-trivial interactions, offering a challenging, but rewarding domain for the video generation itself. To this end, the EPIC-KITCHENS100 dataset was used, which contains videos matching the previously stated description. A recent piece of work, HOI-GAN, has been published, which also matched this project's high-level goals. As such, this project was focused on a re-implementation of HOI-GAN in order to match their results. No source code was publicly available for this project and as such, the training pipeline from pre-processing, to training sample gathering, down to training itself was implemented from scratch. The exception to this is the network architecture, which was kindly provided by the lead author of HOI-GAN.

There was an abundance of experiments conducted, many of which were analysed both quantitatively and qualitatively. As such, this project showed many interesting results and offers a detailed insight into the world of GAN training, highlighting their incredibly fickle nature, which is not to be understated. The main contributions of this project, involved:

- A pipeline which performs a set of pre-processing on the EPIC-KITCHENS-100 dataset, creating custom training/test splits which ensure a zero-shot nature to training
- A sophisticated training sample selection procedure, which allows for data to be correctly formatted in order to effectively train the network
- A training loop that allows for the training of the GAN and each of its sub-networks, periodically outputting its generated results.
- A series of detailed quantitative and qualitative analyses for a range of experiments conducted during this project.

Projects

VR Horror Experience:

This was a third-year university project, which was a VR horror game, developed in a team of 7, where the player had to navigate a desolate and decrepit hospital trying to survive from a monster which stalked them. I was elected lead programmer of this project and was required to oversee and manage the entire code base. Features of the game included:

- An extensive, interactable items/triggerable events framework for the player to use
- Monster AI pathfinding
- Custom particle effects, textures and models designed by the development team

66 Days:

This was a second-year university project, which was a habit-tracking and management app, developed in a team of 4, which allowed the user to set goals for positive habits they wished to achieve. This app was developed for a client who provided us with a list of requirements. The client had also designed a "habit management course" and wanted the content to be delivered on a separate section of the app. They also required that the app native to both Android and iOS and supported features such as:

- Account creation and sign in
- Monitoring statistics and visualising habit progress on graphs for the user
- Support for the client to update the app content on a separate website
- Monitoring course engagement and habit tracking success on the client's website