CSC3032 PROJECTS BOOKLET (2021-22)

Software Engineering Final Year Project

Sample EoIs (Limited Distribution)

Teaching Team:

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P05 Data Science Environment for Machine Learning

The data science team working in COMPANY's AI and Data Solutions group in Belfast specialise in machine learning classification problems and natural language processing (NLP). A typical challenge that we are faced with in any classification problem is collecting enough high-quality document annotations or classifications in a standardised machine-readable format for model training and evaluation.

The proposed project would be to design and build a web-based annotation tool for classification or annotation of un-structured text files (or images) though a user-friendly interface. The ideal solution would be capable of allowing multiple users to simultaneously view and categorise documents from a classification hierarchy and store annotation metadata directly into a database. In addition, users should be able to retrieve and display the annotation history for a document. As a stretch goal the students could investigate building an MLOps framework for incorporating the classification metadata into a model re-training and evaluation pipeline.

Our aim is that the project would allow students to build experience in and demonstrate a wide variety of technical skills such as API development, user interface design, front-end and back-end service development, and serve as an introduction to NLP and machine learning problems faced in typical client engagements. Throughout the project students would be strongly encouraged to develop their business and project skills through requirements gathering, code reviews, deliverable presentations, and end user evaluations.

Technical Skills (Required or Desirable)

We envisage that the solution would be built using open-source technologies. The specific programming languages and frameworks adopted would ultimately be left to the students to select the best technology for the problem, or one in which they feel most comfortable in developing with. Possible technical skills that would be required include:

- API and Web development – Swagger/OpenAPI, HTML5, CSS, Javascript
- Backend services – Python, Flask, Django
- Database design e.g. PostgreSQL, MongoDB
- Containerisation and orchestration – Kubernetes, Docker, Docker-compose

About the Organisation

COMPANY's DESCRIPTION

Number of Teams

just 1 team

P12 Making Unbuilt Architecture Visible

MSc Advanced Architectural Design students will design a new building in Belfast, entitled Weddings and Funerals, using cinematic techniques in their design and representation processes. Would you be willing to work with them to create an AR app in which their digitally- and three-dimensionally rendered buildings can be seen on the project site through the screen of a mobile phone? Or, you may decide to create a VR experience with a headset using their site and building drawings.

In terms of creativity, in this project, the sky is the limit. If you agree to do this live project, you will collaborate with 5 outstanding architects, learn a lot from each other and have fun!

Technical Skills (Required or Desirable)

- Comprehension of 2D and 3D drawings so that they can be converted into AR and/or VR environments - this will be a bit like game design
- Appreciation of buildings and cities around us

About the Organisation

Architecture at Queen's is an established school of architecture in the UK/Ireland with a good balance of skilled local and international students. Ranked 6th in the UK in Guardian University Guide 2021. Ranked 9th in the UK in Complete University Guide 2021. 8th in the UK in Times & Sunday Times Good University Guide 2021 www.architectureatqueens.co.uk ; www.instagram.com/msc.arch.

Number of Teams

Just 1 team

P14 Capture & Connect: Mobile App Supporting Pathologists In Sub-Saharan Africa

Pathology centres in Sub-Saharan Africa (SSA) face challenges from the limited availability of pathologists, inadequate equipment, highest age-standardized breast cancer mortality rate worldwide and unreliable access to a consistent power supply. The robust infrastructure in SSA created for mobile banking can be exploited to support the provision of health care services through mobile devices and cloud computing. EEECS and Digital Pathology Researchers in PMC have collaboratively developed a prototype mobile application, named Capture and Connect (C&C), to digitise histological samples and use Artificial Intelligence (AI) to automatically analyse the data. Pathologists mount their mobile device on a microscope and use C&C to take a picture. Pathologists can share histological images with colleagues for a second opinion and use functions to automate and support clinical decision-making for breast cancer diagnosis. The groups' aim is to deploy C&C to low- and middle-income countries where digitisation of pathology services is hugely underdeveloped. This project will aim to refine the mobile application, enhance the machine learning capabilities of the application, and generate real-world user testing. The project will be completed in conjunction with researchers in EEECS (Dr Richard Gault) and QUB Digital Pathology (Dr Stephanie Craig).

Technical Skills (Required or Desirable)

Experience with any or all the following technologies is desirable:

- Xamarin Forms
- XAML, C#
- Auth0 API
- GoLang +PostgreSQL
- Docker
- Kubernetes with Rancher (recommended that at least some of the team are enrolled in the Cloud Computing module)
- Gitlab (or Github) continuous integration
- Unit testing with NUnit framework

About the Organisation

The Precision Medicine Centre of Excellence (PMC) at Queen's University Belfast is a new clinical laboratory bringing together high-throughput genomics, digital pathology and big data analytics in a fully integrated fashion. The PMC aims to accelerate the translation of potentially relevant diagnostic, prognostic and therapeutic findings into clinically actionable information by applying state-of-the-art technology in a clinical laboratory environment. After the 'molecular revolution', the introduction of artificial intelligence in diagnostic and therapeutic medicine represents a new frontier, and digital pathology (DP) is one of its most obvious applications. Our PMC has experience in helping industry to bring new DP diagnostic algorithms to the market and, together with our capacity in genomic medicine, represents an unparalleled opportunity to engage in true, integrated analyses to support industry product development, clinical trial endeavours and programmatic research.

Number of Teams

Just 1 Team

P18 Fermanagh Community Transport System

Fermanagh Community Transport (FCT) operate a Dial-a-Lift service to eligible members within the community. This service offers transport through a fleet of vehicles and paid professional drivers. Lifts are booked for individuals but also groups can request bookings for specific events as required. To support this service FCT have existing computer systems some of which are required through regulation. Specifically the Vision Tracks system tracks the drivers through a smartphone app and provides real-time location data to the office (but not to customers) and a system called Kittens handles booking. This project is to implement system(s) to support FCT in their delivery of this vital service and to help them work more efficiently in supporting their members. Further requirements engineering will be expected in collaboration with FCT but the general outline of the project would be the delivery of a system (web based mobile friendly or mobile app). The possible functional requirements are initially identified as:

1. Allow members to login
2. A request can be made to update key detail such as emergency contacts or mobile numbers
3. A request can be made to book a journey
4. Messages regarding a booking can be sent from FCT to the requesting account.
5. Confirmed bookings can be recorded in the system including assigned vehicles.
6. Users can see the progress of their vehicle to collect them

Technical Skills (Required or Desirable)

HTML, API

About the Organisation

https://www.fermanaghcommunitytransport.com/

Number of Teams

Just 1 Team

P20 Custom Product Design & Order service for Creative Experience Web-platform

COMPANY has come up with a unique wall covering solution that is more sustainable than traditional decorative plastering or wallpapering. Now COMPANY is working on a project that will allow online buyers to design and order their handmade wall finish in a few easy steps. An online design & order service will replace a lengthy and costly traditional bespoke design process by letting the buyer build their Italian plaster mural from a selection of tile-like reusable design elements, offering a life-long product value to customers. The service should enable users to build murals like a mosaic by putting various design elements together, picking them by colour, design category, size or cost criteria. The challenge is to make this service easy-flowing, encouraging buyers to get creative for an ultimate user experience. It would need to be easy to plug into an e-commerce website. We want to make sure that we don't just sell a product but offer buyers a meaningful experience that stretches beyond their visit to the webpage. The entire web platform will serve to educate buyers about the craft, handmade value and creative ways of reusing the product in a mindful and sustainable way. The design & order service should fit into this entire experience model. This is a creative project with a strong focus on user experience that will encourage you to think beyond just coding. While working on this project you will learn about the creative/ interior industry, human experience engineering and experience economy.

Technical Skills (Required or Desirable)

It's a bonus if you have the knowledge or skills in the following areas: UX and UI design, Human experience design and social engagement, Agile development methodology, An Interest in a creative industry, interior or arts, Graphic design.

About the Organisation

COMPANY's Description

Number of Teams

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