Kunlun Wang

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EDUCATION

Columbia University (MS) 09/2021-
Major: Biomedical Engineering
University of Wisconsin-Madison (BS) 09/2017-06/2021
Double Major: Biochemistry & Computer Science
UM-Madison Academic Scholarship: $1000 05/2020 & 05/2019

LAB EXPERIENCES

Lacry Intelligence: Smart Video Processing Software for Remote Microscopes 05/2020-05/2021
Undergraduate Research Assistant in UW-Madison Coyle Lab (Department of Biochemistry)

- Built a network platform for people who don't have access to biology labs to remotely operate the microscope and observe and analyze the microorganism samples by typing commands on the platform
- Used an open-source object detection framework called Ultralytics YOLOv5 Pytorch and programmed a YOLOv5 algorithm based convolutional neural network model to efficiently conduct real-time object recognition
- Trained the model with more than 2,000 intercepted microorganism images of active and dormant state
- Object detection model achieved a high mean average precision (mAP@0.5) of 97%
- Built a tracking algorithm to accurately track and label each microorganism, achieved 70% accuracy
- Built an analytical user interface with synchronous data transmission function that efficiently collects data about the active & dormant & transition time periods
- Achieved real-time identification, tracking, labeling, and statistical analysis of microorganisms, and greatly improved the efficiency of data analysis

Scopestream: A Smart Chatbot on Twitch 10/2020-12/2020
Undergraduate Research Assistant in UW-Madison Coyle Lab (Department of Biochemistry)

- Made a chatbot in Python to interact with the audience on Twitch and receive the audience's commands to operate microscope remotely
- Used Python socket programming to allow the audience's interaction with the chatbot, imported the automated microscope's Python class to connect the chatbot with the microscope controller code to enable users' control of the microscope

Australian Mistletoe Project 01/2019-05/2019
Undergraduate Research Assistant in UW-Madison Damschen Lab (Department of Integrative Biology)

- Used botanical methods to analyze the eucalyptus and mistletoe leaves in different areas of Australia; utilized statistical techniques to propose the physiological structure/metabolic function of mistletoe and eucalyptus
- Wrote a paper to propose ecological implications of the mistletoe infestation on the forests; provided theoretical basis and support for Australian biotechnology to remove infection; presented to the public and researchers in the Research Conference, and obtained the certificate of Individual Project
- Designed a series of chemical reagents to remove the cuticle and mesophyll of the leaves and treated 55 pairs of leaves with this reagent design; applied ImageJ to measure the leaf vein length per area (LVA) and conducted the statistical analysis and so on

PROJECT EXPERIENCES

Homework Hub: School work management software built for elementary school 01/2021-06/2021

- Developed a lightweight, responsive web application using React framework, Bootstrap, SCSS, JavaScript, PHP, and MySQL. The application is built to help elementary school teachers to post updates

on the topics they are covering in class, important announcements, homework assignments, and tests dates. No longer will parents and teachers have to worry about whether everyone is up to speed, allowing a classroom to run smoothly and the children to learn more effectively.

- The application utilizes a Model-View-Presenter system architecture and has two user portals. Teachers are able to login to the teacher portals in which they have the administrative power, parents are able to login to the parent portals in which they are able to view schoolwork and send requests.
- The application contains a variety of functions such as secured Login/Register system, Profile editing, Create/Edit/Delete Classroom, Homework/Test/Announcement Management System, Calendar View, Chat Room, etc.

Escape the Haunted Hospital: VR game built with Unity and C# (on-going) 01/2021- Now

- Developed an immersive puzzle solving horror game that takes place in an abandoned mental hospital environment. Gained significant amount of knowledge about Unity, Blender, and C#.
- Accomplished: 1. Creating a terrain environment 2. Implementing weather particles 3. Manipulate lighting 4. Add animation to interactable objects 5. Jump scare trigger 5. Key-lock mechanism 6. Digital lock mechanism 7. Designing of complex environment 8. Inventory system 9. Item usage system etc.

The Effect of Glutamic Acid 106 to Aspartic Acid Mutation in the Active Site of Human Carbonic Anhydrase II 09/2020-11/2020

- To study the effect of Glu106 to Asp mutation on protein stability, enzymatic activity, and ligand binding of HCAII
- Efficiently used biochemistry lab techniques (PCR, Gibson Assembly, the transformation of E.Coli, minipreps, blue/white screening, expression of HCAII with T7 promoter system and Lac operon, immobilized metal affinity chromatography, dialysis, SDS-PAGE electrophoresis, fluorescence spectroscopy prism analysis, FRET, etc.) to study the effect of the mutations on the HCAII enzyme, combining with computational biochemistry techniques (PyMol, conservation analysis, prism analysis)

Carbon Minus Minus(C- -) 07/2019-02/2020

- Designed a smart home energy-saving system and planned its market structure in Madison, Wisconsin
- Implemented a customized user interface(UI) for wirelessly connected homes by Java/JavaFX

Phosphorus Concentration upon a Rural-urban Gradient in Lake Mendota 09/2019-12/2019

- To determine if the concentration of phosphorous varies across different locations of Lake Mendota in Madison, WI.; determine locations with possible fertilizer runoff or other contamination
- Designed and implemented the project, used ascorbic acid method to determine the total phosphorous concentration of lake water sample; efficiently used analytical chemistry techniques, including generation of absorption spectra, generation of the calibration curve, determination of MDL, digestion of lake water samples, ICP analysis, Spike recovery, ANOVA test, etc.

Doom Tower: Puzzle-solving Role-playing Game built with RPG Maker and Ruby 07/2019-12/2020

- Wrote a strategy and puzzle-solving role-playing game (RPG) in Ruby, including initialized leading actor property, combat calculation, enemy data processing, actor skills, enemy skills, etc.
- Utilized the knowledge of finite state machine in computing theory to design game elements
- Wrote a user interface to help users understand how to use game items, archive, and read files

Graphics Town: 3D modeling using JavaScript and OpenGL shading language 01/2020-06/2020

- Programmed a complex and interactive 3D city; applied advanced computer graphics theory and algorithms such anti-aliasing, Bezier curve, advanced texturing/shading/lighting, B-spline, 3D projection, Z-buffer algorithm, Euler's theorem, Barycentric interpolation, anisotropy, polygonal meshes, etc.

INTERNSHIP EXPERIENCE

American Family Insurance Internship: Mileage Extraction from Odometer Pictures for Automating Auto Insurance Processes 09/2020-12/2020

Capstone Intern, Software Development

- Supplied customers with an easy and streamlined way to provide all the information needed when reporting a claim or asking for a quote
- Developed a mobile app to allow the customers to manage their insurance plan/status completely on their phones; implemented various function such as personal account, car status, insurance plan, schedule appointment, report accident, etc.; embedded a computer vision model called OCR to accurately extract odometer mileage information from users' uploaded images
- Acted as a Scrum Master, facilitated the practice of agility, contributed to team agile practices, daily Scrum, and front-end and back-end development

EXTRACURRICULAR ACTIVITIES

CS Learning Center Tutor, UW Madison Department of Computer Sciences 09/2020-12/2020

- Tutored students who were taking basic programming courses (CS200, CS300, CS400, CS354)

Outreach Manager, UW-Madison Badger Mentorship 01/2020-05/2021

- Promoted the club, recruited new members, and held a number of academic and recreational events

PROFESSIONAL SKILLS

Computer skills: Java (4yrs), C (2yrs), Python (2yr), JavaScript (2yrs), HTML (2yrs), R (2yrs), CSS (2yrs), MATLAB (1/2 yr), C++(1/2 yr), C# (1/2 yr), PHP (1 yr), PyMol(1/2 yr), React native(1/2 yr), React (1 yr), GLSL (1/2 yr), Expo(1/2 yr), Mysql(1/2 yr), Agile(1/2 yr), Scrum(1/2 yr)

Experimental skills: Intermediate biology/biochemistry/analytical chemistry/organic chemistry lab techniques

Language Skills: Mandarin (Native), English (Proficient), Russian (Conversational)