Project Portfolio

Xiaoyan Wu

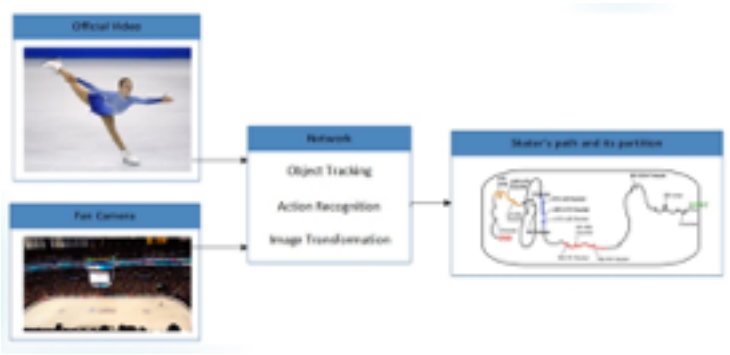
Xiaoyan Wu has focused her research interest on computer vision and machine learning. Xiaoyan has been doing researches that are close to her goal of using computer vision to bring more information beyond human vision. This portfolio demonstrate her main projects including research projects, course projects and startup projects.

Research Projects

The followings are the research projects that Xiaoyan has worked on or currently working on. These researches use technologies including motion tracking, action recognition, image transformation, optical flow and deepNet machine learning.

Path Finding and Action Recognition in Figure Skating Videos

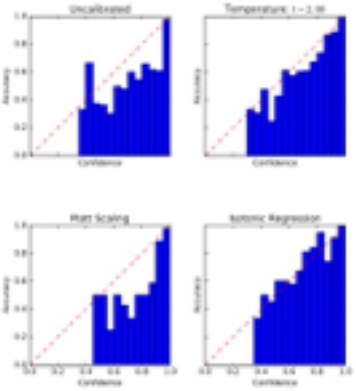
May 2016 - present Researcher with Prof. Serge Belongie, Cornell Tech



The goal of this research project is to track a figure skater's skating path and recognize the skater's actions given figure skating videos. This is to facilitate the judging system of figure skating, and also let viewers understand the complexity of skaters' programs more easily. Xiaoyan started this project because she is a beginning figure skater and would love to contribute to this sport. This project combines motion tracking, action recognition and image transformation to produce the final result. The image transformation is used to transform the motion tracking result to a virtual overhead view, so that the skater's actions could be labeled on the graph. Layer optical flow is also applied to figure skating videos so that the action recognition result could be more accurate.

Calibrating Probabilistic Outputs of Deep Learning Networks

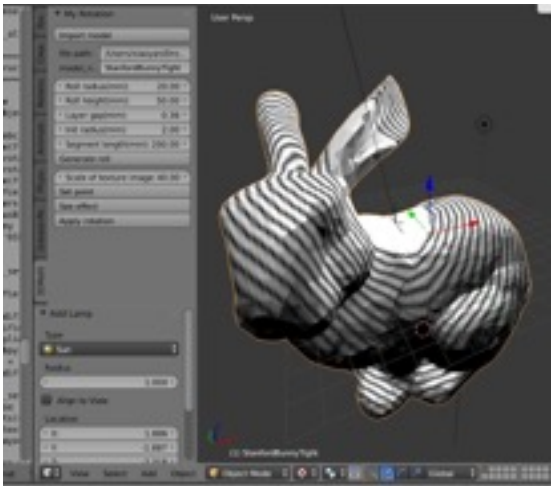
August 2016 - present *Researcher with Prof. Kilian Weinberger, Cornell University*



The motivation of this project is that the confidence output by deepNets does not reflect its true accuracy; a classification result with 0.9 confidence is not 90 percent correct, and it usually tends to be overconfident. This research project is about calibrating the confidence so that it reflects its accuracy correctly. The datasets used to test are Cifar10, Cifar100 and Google Street View dataset. Different calibration models, including temperature model, Platt Scaling and Isotonic Regression, are compared with the uncalibrated model. The temperature model is a method applied to the softmax layers, and works very well. The platt scaling and isotonic regression are traditional calibration methods that are also tried and compared.

Software Pipeline for 3D Rolling system

August 2015 - August 2016 *Researcher with Prof. Francois Guimbretiere,Cornell University*



The goal of this research project is to develop a software pipeline that could connect to the hardwares of a 3D roll printing system. It creates a user interface in Blender where users could edit the parameters of the cutting roll. Then the software pipeline generates the 3D roll model by specifying positions of all vertices given the user-defined parameters. Using this software, users could see the effect of the cutting pattern and also edit the axis of the roll to find the best orientation. The visualization of the cutting pattern is implemented using uv mapping. Once users have decided the pattern, the program will automatically generate the pdf pages that could be sent directly to laser cutter.

Coco Reader: Image Reader for the Blind

April - August 2015 Researcher with Prof. Serge Belongie, Cornell Tech

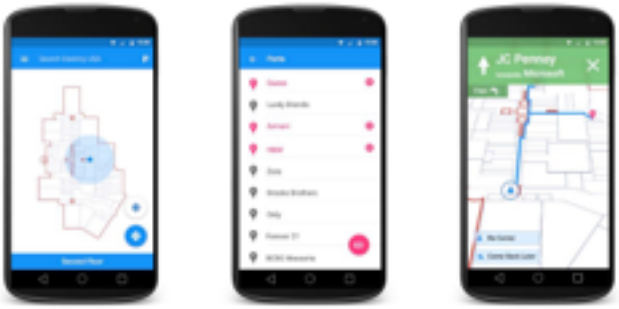
The goal of this project is to develop an image-describing method to help visually impaired people understand images better and more efficiently. The motivation is that visually impaired people could use this tool to "see" images in daily life. The mechanism takes in Google OCR outputs, object annotations, and visual attention predictions as raw sources of information about an image, and then integrates them into human-readable image descriptions that make visual content in images (context, texts, objects, etc.) accessible to the visually impaired. After implementing the project in python, small-scale user testing was conducted where we compare images drawn by users and the real images to see if the image is correctly described.

Additional Projects

The following projects are programming projects beyond research projects, including startups and building games. These projects use technologies like Wifi indoor positioning and GPS positioning, and libraries like LibGDX and OpenGL.

Web Development and iOS app development at Navo, Inc (startup)

Navo, Inc is a student startup founded by a group of Cornell students. It aims to build indoor navigation apps that could be used in large shopping malls. The indoor positioning technology combines the use of wifi, GPS, and motion sensor. The team presented in incubators and sought to cooperate with shopping malls like Destiny USA in Syracuse. The team came to Destiny USA to collect Wifi signal data points, and built navigation apps that could be used at this place.



PC Strategy Game “Aiden” Development

Aiden is the name of a strategy game developed as a game design course project. The team has six members, including one designer and five programmers. The team came up with the game idea, designed the game elements, and built the game in Java. It is a strategy game where the main character is a fire spirit named Aiden. Aiden’s movement follows gravity and it could burn down wood blocks to figure out a way to reach the fireplace (goal). Xiaoyan played an active role as a project leader in the team, and coordinated the communication between designer and programmers. The code is written in Java using LibGDX.

PC Room Escape Game “Room” Development

Room is the name of a room escape game developed as a computer graphics course project. The game is developed by two programmers. Xiaoyan worked with her partner to design the game and implemented in Java using OpenGL. Xiaoyan was responsible for creating the 3D models in Blender, implementing the user interaction controls and adding shaders for some of the game objects. The main purpose of this project was to create shaders that simulate the look of real world objects. There are water, fire, lava and wood simulated in the game.