Marcus Loo Vergara

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SUMMARY OF QUALIFICATIONS

Senior student at the Norwegian University of Science and Technology working towards a master's degree in Computer Science. Specializing in computer graphics and computer vision, with a recent focus on deep learning. Expecting graduation June 2019. Self-motivated, quick learner, and enjoy helping others.

- C/C++
- OptiX & CUDA
- OpenGL & GLSL
- Python
- Deep Learning
- Keras, PyTorch & TensorFlow
- TCP & UDP
- Windows & Linux
- JavaScript, HTML & CSS

EDUCATION

Norwegian University of Science and Technology, Trondheim, Norway — Aug 2013 – Expected Jun 2019
Master of Science in Computer Science — GPA: 3.1/5
- Specializing in computer graphics, computer vision, and deep learning

University of California, San Diego, San Diego, USA — Oct 2017 – Jun 2018
Master of Science in Computer Science — GPA: 3.5/4
- Studied at UC San Diego for a year

WORKING EXPERIENCE

Graphics Engineering Intern at Sony Interactive Entertainment, San Mateo, USA — Jul 2018 – Sep 2018
Internship at SIEA's Developer Technology Group (DTG)
- Created a performance analysis tool for the PlayStation 4™ that visualizes certain aspects of the performance of the GPU; with the intention of making a tool that can be used by DTG to more quickly find and suggest improvements to their customers
- Implemented the metallic workflow – a physically-based shading technique – into a rendering engine that runs on the PlayStation 4™
- Trained a simple autoencoder to generate metallic, roughness and ambient occlusion textures from albedo and normal maps only
- Exposure to low-level programming for specialized hardware
- Gained experience in teamwork and good coding practices

Software Developer at Grabster, Trondheim, Norway — Jul 2017 – Aug 2017
Summer job assisting a start-up in app development
- Grabster is a sharing economy platform based on buying and selling food between individuals
- Implemented and tested screen navigation and backend functionality for the Android app
- Gained experience in using *React Native* and *Node.js*

Teaching Assistant at the Norwegian University of Science and Technology — Aug 2015 – May 2017
On-campus part-time job assisting students
- Support and advising in solving theoretical and practical questions
- Graded assignments
- Assigned subjects:
  - Jan 2019 – May 2019: Computer vision and deep learning
  - Jan 2016 – May 2017: Procedural and object-oriented programming (C++)
  - Aug 2015 – Dec 2015: Computers and Digital Design (Assembly programming)

RELEVANT PROJECTS

Reinforcement Learning for Autonomous Vehicles, Thesis — Sep 2019 – Present

Used state-of-the-art deep reinforcement learning methods to teach a simulated car to drive itself in OpenAI's *CarRacing-v0* environment, achieving top results

- Implemented current deep reinforcement learning baseline, *Proximal Policy Optimization*, with Python and TensorFlow
- Substantially decreased training time by scaling the output mean of each action's Gaussian distributions to their respective limits
- Planning to train the same agent in CARLA – a car simulator running in Unreal Engine 4
- Video of results: *https://youtu.be/8X_LSy4TF84*

Optical Flow-Based VFX, CSE 163 Course project — Jun 2018

Implemented an optical-flow based method for smoke and fluid type effects in OpenGL

- Generated alpha, diffuse, normal, and optical flow maps with a third-party program
- Used these maps to blend between frames, creating a smooth, real-time smoke effect
- Technique is based on similar work done in various published games

OptiX Soft Shadows, CSE 274 Course project — Mar 2018

Used NVIDIA's OptiX ray tracer to implement *Axis-Aligned Filtering for Interactive Sampled Soft Shadows*

- Provided a fundamental understanding of the use of frequency analysis in ray tracing
- Achieved *interactive* framerates of about 5-30 FPS on a Nvidia GTX 970

Deep Learning Projects, Course projects — May 2017 – Jun 2018

Summary of some deep learning projects and paper implementations

- Implemented a *Mask R-CNN* based model to detect human joints in images of people
- Experimented with convolutional architectures *PointNet* and *PointNet++* to segment stem and leaf points in point scans of plants – with some scans having more than a million points
- Implemented a recurrent LSTM model to automatically generate captions for images
- Trained a *Faster R-CNN* model to identify and locate cars in images taken on the road

Game Engine Programming, Side-project — 2010 – Present

Writing a game engine from scratch in C++

- Ongoing side-project since 2010
- Uses OpenGL 3.2 and Simple DirectMedia Library to render to the screen
- Intended to serve as a mode of learning the inner-workings of game engines
- Developed alongside an infinite procedurally generated sandbox game
  - See my homepage, *bitsauce.github.io*, for more information regarding these and other projects

CAMPUS ACTIVITIES

Abakus GameDev, Norwegian University of Science and Technology — Aug 2014 – Present

Co-founder and leader of student organization *Abakus GameDev* – a student organization for people who enjoy making games, discussing their development, design, and the industry in general

- Responsible for creating a socket-based framework that was used for AI competitions
- Participates in meetings, discussing workshop ideas and advertising
- Held a presentation on deep reinforcement learning for games