Dale Grant

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Summary

Dale is a University Lecturer in game design and programming at the University of Technology Sydney. Through his PhD candidacy, he specializes in the utilization of Deep Reinforcement Learning for video game navigation. Dale's focus is to improve the applicability of DRL agents in video game development due to their potential to optimize development time and allow for novel player experiences.

Dale was previously a PhD candidate at the Australian National University where he published in international peer-reviewed conferences and journals. Dale completed his Bachelor of Science with First Class Honours in Physics/Applied Mathematics at the University of Sydney. His experience in applied mathematics, game development, and data analytics equips him with the tools to excel in the information technology sector.

Education

Doctor of Philosophy in Computer Science

University of Technology Sydney

Researching the applications of Deep Reinforcement Learning for Artificial Intelligence in video game navigation with a focus on navigation methods for dynamic environments. Testbed environments implemented in Unity (C#) via the MLAgents framework and utilize custom DRL algorithms in Python/Pytorch.

Doctor of Philosophy in Engineering

Australian National University, Canberra

Researched perovskite-silicon tandem solar cells with a focus on the optimization of optical performance to achieve world-record efficiencies. Coded optical simulations in MATLAB/Python. Presented findings at three conferences in Australia and Italy and published a first author paper in OSA Optical Express (DOI: 10.1364/OE.24.0A1454).

Bachelor of Science in Games Development

University of Technology Sydney

Major: Games Development
Sub-Major: Data Analytics
Awards: Dean's List (2018/2020), Dean's Merit List (2019), University Medal (2021)
Outcome: 6.92/7.00 GPA

Bachelor of Science (Honours) (Physics)

University of Sydney

Majors: Applied Mathematics, Physics
Honours Thesis: Absorption enhancement using dielectric gratings for thin-film solar cells
Outcome: 1st Class Honours

Employment

University Subject Coordinator

University of Technology, Sydney

Introduction to Games Development

Introduces the general pipeline of video games development using the Unity Game Engine. Exposes students to common industry terminology, core interface tools, application of vector/matrix mathematics to objects in 2D/3D space, audio and animation asset management, game state managers, and physics programming. Students are assessed via weekly programming exercises, and a classic game recreation/innovation project.

Responsibilities

- Introduced foundational language and theory of game development technology via Unity game engine.
- Instructed students during workshops to implement theoretical concepts in practice.
- Coordinated release, marking, and feedback of assessments with contracted tutors.
- Communicated and mediated difficulties with students.

University Lecturer

University of Technology, Sydney

Advanced Games Programming

Explores advanced programming topics in games development such as Procedural Content Generation, Multiplayer Networking, and Artificial Intelligence. Topics are taught via Unreal Engine, utilizing C++ and blueprint workflows. Students are assessed with weekly code projects, creation of a tutorial on a subject of their choice, and creation of a prototype that implements an advanced AI or PCG technique alongside multiplayer functionality.

Responsibilities

- Established usage of Unreal Engine 4 to students for both blueprints and C++ implementations.
- Enforced concepts such as Procedural Content Generation, Multiplayer Networking, and Artificial Intelligence during practical workshops.
- Guided students in researching, designing, and implementing their own coding projects in UE4.
- Mediated student concerns and issues on a case-by-case basis.

University Tutor

University of Technology, Sydney

Introduction for Game Design

Introduces students to the basic formal, systematic, and dramatic elements of Game Design and the iterative process of game development. Theory is enforced through practical workshops where students form groups to ideate, develop, iterate, and refine a game concept over many weeks. Student projects involve the creation of a physical board game and a digital game with weekly playtest sessions with fellow students for feedback.

Responsibilities

- Imparted game design concepts via both theoretical and practical applications.
- Facilitated and instructed students on the iterative process of game design from ideation to completion.
- Guided board game and Unity game projects to ensure adherence to game design theory.
- Taught classes of 20+ students with an average grade of 74%.

Skills

Programming
- **Programming Languages:** Python (6 years), C# (5 years), C++ (4 years), MATLAB (4 years)
- **Scripting Languages:** Python, Bash
- **Data Structures:** Digraphs, Octrees, Hash Tables
- **Version Control:** Git, Gitlab, Bitbucket

Game Development
- **Game Engines:** Unity (5 years), Unreal 4 (3 years), Godot (1 year)
- **Physics Programming:** 2D/3D Vectors/Matrices, Custom Gravity Systems, Rigidbody Character movement
- **Graphics Programming:** Dynamic Particle Systems, 3D Graphics Pipeline, Shader Programming
- **Gameplay Programming:** Player input systems, FPS controllers

Machine Learning
- **Libraries:** Pytorch, Numpy, Matplotlib, Tensorflow
- **Machine Learning:** Feature Extraction, Convolutional Neural Networks (CNNs), Object Detection
- **RL Algorithms:** Proximity Policy Optimization (PPO), Soft Actor Critic (SAC)
- **DRL in Games:** AI Navigation with depth vision & occupancy maps, MLAgents

Recent Projects

A Rainy Day (PC) *2020*
Roles Assumed: Game Design, Game Architecture Programmer, UX Designer
Engine: Unity/C#
Summary: An isometric puzzle game that involves sliding buildings around a diorama to guide the crowd from the start to the end goal. A capstone project for B. Sc. In Games Development undertaken as a 4-person programmer team with 2 audio students. Dale implemented service locator functionality for the game loop, interactables system, in-game UI, and interactive audio system.

Scallywags (PC) *2020*
Roles Assumed: Game Design, Game Programmer, Menu Designer
Engine: Unity/C#
Summary:
A top-down party game where up to 4 players in local co-op command a pirate crew to hunt for hidden treasure, fight enemies, and cause mayhem. A student society run project developed over 7 months with a 14-person multidisciplinary team. Dale implemented the menu system, character select system, the player input system, and game design direction of the project.

Project Survival Shooter (PC) *2020*
Roles Assumed: AI Programmer, Game Programmer, VFX Programmer
Engine: Unreal 4/C++
Summary: A wave-based, online multiplayer, first-person shooter with procedural levels and difficulty settings. A 2-person project produced as part of the Advanced Games Programming subject. Dale implemented the Jump Point Search algorithm for pathfinding, variable difficulty setting that influences enemy spawn count and rarity, and Niagara visual effects for polish.

Ozymandias (PC) *2020* -> **Fantasy Town Regional Manager (Steam, PC)** *2021*
Roles Assumed: Game Design, Game Programmer, Environment Design
Engine: Unity/C#
Summary: A turn-based city builder where the player operates a town of fantasy adventurers. A capstone project for B. Sc. In Games Development undertaken as a 6-person team. Dale implemented environment shaders, water shaders, environment design, the day-night transition cycle, and boid navigation for environmental birds.