2017 IEEE Conference on Computational Intelligence and Games (CIG 2017)

New York, New York, USA 22 – 25 August 2017



IEEE Catalog Number: ISBN:

CFP17CIG-POD 978-1-5386-3234-5

Copyright © 2017 by the Institute of Electrical and Electronics Engineers, Inc. All Rights Reserved

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

*** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.

IEEE Catalog Number: CFP17CIG-POD ISBN (Print-On-Demand): 978-1-5386-3234-5 ISBN (Online): 978-1-5386-3233-8

ISSN: 2325-4270

Additional Copies of This Publication Are Available From:

Curran Associates, Inc 57 Morehouse Lane Red Hook, NY 12571 USA Phone: (845) 758-0400

Fax: (845) 758-2633

E-mail: curran@proceedings.com Web: www.proceedings.com



CIG 2017 Table of Contents

Table of Contents

Autoencoder-augmented Neuroevolution for Visual Doom Playing	1
Measuring Strategic Depth in Games Using Hierarchical Knowledge Bases	9
General Video Game Playing Escapes the No Free Lunch Theorem	17
Mixed-Initiative Procedural Generation of Dungeons using Game Design Patterns	25
Games and Big Data: A Scalable Multi-Dimensional Churn Prediction Model	33
Using Multiple Worlds for Multiple Agent Roles in Games Joseph Alexander Brown and Daniel Ashlock	37
Detecting Flow in Games using Facial Expressions	45
Monte Carlo Tree Search Based Algorithms for Dynamic Difficulty Adjustment	53
Combining Cooperative and Adversarial Coevolution in the Context of Pac-Man	60
An Intentional AI for Hanabi	68
Towards a Hybrid Neural and Evolutionary Heuristic Approach for Playing Tile-matching Puzzle Games	76
Adaptive Gameplay for Mobile Gaming	80
Rolling Horizon Evolution Enhancements in General Video Game Playing	88
BD Cylindrical Trace Transform based feature extraction for effective human action classification	96
A Fuzzy System Approach for Choosing Public Goods Game Strategies	.04
Evolved Communication Strategies and Emergent Behaviour of Multi-Agents in Pursuit Domains	10
Beyond Playing to Win: Diversifying Heuristics for GVGAI	18

CIG 2017 Table of Contents

CiF-CK: An Architecture for Social NPCs in Commercial Games	126
Building an Automatic Sprite Generator with Deep Convolutional Generative Adversarial Networks	134
Simulating Strategy and Dexterity for Puzzle Games	142
Extracting Gamers' Cognitive Psychological Features and Improving Performance of Churn Prediction from Mobile Games	150
Procedural Generation of Angry Birds Fun Levels Using Pattern-Struct and Preset-Model : Yuxuan Jiang, Tomohiro Harada and Ruck Thawonmas	154
Learning Macromanagement in StarCraft from Replays using Deep Learning	162
General Video Game Rule Generation	170
Opponent Modeling based on Action Table for MCTS-based Fighting Game AI	178
Text-based Adventures of the Golovin AI Agent	181
Optimizing Game Live Service for Mobile Free-to-Play Games	189
Showdown AI Competition	191
Fight or Flight: Evolving Maps for Cube 2 to Foster a Fleeing Behavior	199
Learning Human-like Behaviors using NeuroEvolution with Statistical Penalties	207
Using Monte Carlo Tree Search and Google Maps to improve Game Balancing in Location-based Games	215
Learning to Play Visual Doom using Model-Free Episodic Control	223
Automated Learning of Hierarchical Task Networks for Controlling Minecraft Agents Chanh "sam" Nguyen, Noah Reifsnyder, Sriram Gopalakrishnan and Hector Munoz-Avila	226
Improving Generalization Ability in a Puzzle Game Using Reinforcement Learning	232
Automated Game Design Learning	240

CIG 2017 Table of Contents

Introducing Real World Physics and Macro-Actions to General Video Game AI	248
DLNE: A Hybridization of Deep Learning and Neuroevolution for Visual Control	256
Resource-Gathering Algorithms in the Game of StarCraft	264
Monte Carlo Tree Search Experiments in Hearthstone	272
Procedural Level Generation using Multi-layer Level Representations with MdMCs 2 $Sam\ Snodgrass\ and\ Santiago\ Onta\~n\'on$	280
Generating Varied, Stable and Solvable Levels for Angry Birds Style Physics Games 2 $Matthew\ Stephenson\ and\ Jochen\ Renz$	288
Single Believe State Generation for Partially Observable Real-Time Strategy Games 2 Alberto Uriarte and Santiago Ontañón	296
Cellular Automata Simulation on FPGA for Training Neural Networks with Virtual World Imagery	304
Deep Q Networks for Visual Fighting Game AI	306
Improving Hearthstone AI by Learning High-LevelRollout Policies and Bucketing Chance Node Events	309
Monte Carlo Tree Search with Temporal-Difference Learning for General Video Game Playing	317