[2021]

3rd IEEE Conference on **Games**

17–20 AUG | IT UNIVERSITY OF COPENHAGEN (VIRTUAL)

IEEE | IEEE Computational Intelligence Society | IT UNIVERSITY OF COPENHAGEN

Conference Program

Pre-Conference Day - Monday 16/08/2021

15:00-16:00 CET	**IEEE Student Activities Session**
16:00-17:00 CET	**IEEE Student Activities Session**
17:00-18:00 CET	**Long Break**
18:00-19:00 CET (Plenary)	Pre-conference opening Keynote by **Victoria Tran**

Tuesday 17/08/2021

13:00-14:00 CET (Plenary)	Opening Vision: **General Board Game concept** Sponsored talk: **King.com**		
14:00-15:00 CET	**AI for Playing Games** Stefan Edelkamp *Knowledge-Based Paranoia Search in Skat* Zhejie Hu and Tomoyuki Kaneko *Hierarchical Advantage for Reinforcement Learning in Parameterized Action Space* James Goodman, Simon Lucas and Diego Perez-Liebana *Fingerprinting Tabletop Games* Kenneth Chang and Adam M. Smith *Boosting Exploration of Low-Dimensional Game Spaces with Stale Human Demonstrations*	**Procedural Content Generation** Linus Gisslén, Andy Eakins, Camilo Gordillo, Joakim Bergdahl and Konrad Tollmar *Adversarial Reinforcement Learning for Procedural Content Generation* Maren Awiszus, Frederik Schubert and Bodo Rosenhahn *World-GAN: a Generative Model for Minecraft Worlds* Sahar Asadi *Content generation: a journey from AI research to content product automation in Candy Crush Saga*	**Applications of Games** Sofia Eleni Spatharioti, Sara Wylie and Seth Cooper *Exploring Q-Learning for Adaptive Difficulty in a Tile-based Image Labeling Game* Julia von Thienen, Kim-Pascal Borchart, Corinna Jaschek, Eva Krebs, Justus Hildebrand, Hendrik Rätz and Christoph Meinel *Leveraging Video Games to Improve IT-Solutions for Remote Work* Julian Tritscher, Anna Krause, Daniel Schlör, Fabian Gwinner, Sebastian von Mammen and Andreas Hotho *A financial game with opportunities for fraud*
15:00-16:00 CET (Plenary)	Keynote by **Jurie Horneman**		
16:00-17:00 CET	**AI for Playing Games** Cem Tutum, Suhaib Abdulquddos and Risto Miikkulainen *Generalization of Agent Behavior through Explicit Representation of Context* Chintan Trivedi, Antonios Liapis and Georgios Yannakakis *Contrastive Learning of Generalized Game Representations* Matthew Stephenson, Dennis J. N. J. Soemers, Eric Piette and Cameron Browne *General Game Heuristic Prediction Based on Ludeme Descriptions* Elizabeth Gilmour, Noah Plotkin and Leslie Smith Learning to Both Act and Observe: An Approach to Partial Observability in Games	**Game Design** Gabriel C. Natucci and Marcos A. F. Borges. *The Experience, Dynamics and Artifacts Framework: a Holistic Model for Designing Serious and Entertainment Games.* Shengyao Xiao, Xiaoyu Cui, Yuanqin Fan, Boyuan Lu, Haiyun Wu, Michael Christel, Shirley Saldamarco and Geoff Kaufman. *Playing through Microaggressions on a College Campus with "Blindspot".* Milan Jaćević. *How the Players Get Their Spots: A Study of Playstyle Emergence in Digital Games.* René Gökmen, David Heidrich, Andreas Schreiber and Christoph Bichlmeier. *Stereotypes as Design Patterns for Serious Games to Enhance Software Comprehension.*	**Applications of Games** Dennis Böhm, Bob Dorland, Rico H. Herzog, Ryan B. Kap, Thijmen S. L. Langendam, Andra Popa, Mijael R. Bueno Perez and Rafael Bidarra *How can you save the world? Empowering sustainable diet change with a serious game* Craig Ferguson, Robert Lewis, Chelsey Wilks and Rosalind Picard *The Guardians: Designing a Game for Long-term Engagement with Mental Health Therapy* Helena Lennholm and Eike Falk Anderson Playing with the Sun: A Virtual Physics *Experience for Nuclear Fusion Experimentation and Learning* *Dario Ostuni, Edoardo Morassutto and Romeo Rizzi* *Make your programs compete and watch them play in the Code Colosseum*
17:00-17:50 CET	**AI for Playing Games** Lilian Buzer and Tristan Cazenave *Playout Optimization* Tristan Cazenave, Swann Legras and Véronique Ventos *Optimizing αμ* Vadim Bulitko, Sergio Poo Hernandez and Levi Lelis *Fast Synthesis of Algebraic Heuristic Functions for Video-game Pathfinding*	**Game Design** Yutong Shi. *Designing and Comparing Time Rewind Mechanics in 2D Interactive Game.* Shikhar Juyal. *An Exploration into "Perceived Sense of Challenge" in Level Design for fast paced Casual Mobile Games.* *Aline Hufschmitt, Adrien Dombrowsky and Adam Sporka.* *Soundoku: A sound puzzle game.*	**Virtual and Augmented Reality** Sebastian Cmentowski, Andrey Krekhov and Jens Krüger *"I Packed My Bag and in It I Put...": A Taxonomy of Inventory Systems for Virtual Reality Games* Thomas Beck and Sylvia Rothe *Applying diegetic cues to an interactive virtual reality experience* Linda Graf, Leslie Scholemann and Maic Masuch *Designing VR Games with Gaze Control for Directing Attention of Children with ADHD*

17:50-18:00 CET	Short Break		
18:00-19:00 CET	**AI for Playing Games** Matthias Müller-Brockhausen, Mike Preuss and Aske Plaat *A New Challenge: Approaching Tetris Link with AI* Tristan Cazenave *Improving Model and Search for Computer Go* Dominik Jeurissen, Mark Winands, Chiara Sironi and Diego Perez Liebana *Automatic Goal Discovery in Subgoal Monte Carlo Tree Search* Arushi Arushi, Roberto Dillon and Ai Ni Teoh *Real time Stress Detection Model and Voice Analysis: An Integrated VR based Game for Training Public Speaking Skills*	**Game Design** Connor Gregor. *Measuring Difficulty of Novel Clockwork Puzzle Using Evolutionary Algorithms.* Leon Mächler and David Naccache. E xplaining the Entombed Algorithm. Gabriel Henriksen Gaspar and Henrik Schoenau-Fog. *An Exploration of Feedback Loops in Friendship Games.* Huang, Joshua Jung, Neil Budnarain, Benn McGregor and Jesse Hoey. *Trust-ya: design of a multiplayer game for the study of small group processes.*	**Virtual and Augmented Reality** Jan Krejsa and Fotis Liarokapis *A Novel Lip Synchronization Approach for Games and Virtual Environments* Felix Born, Linda Graf and Maic Masuch *Exergaming: The Impact of Virtual Reality on Cognitive Performance and Player Experience* Salva Kirakosian, Grigoris Daskalogrigorakis, Emmanuel Maravelakis and Katerina Mania *Near-contact Person-to-3D Character Dance Training: Comparing AR and VR for Interactive Entertainment*
19:00-20:00 CET	**AI for Playing Games** Timo Bertram, Johannes Fürnkranz and Martin Müller Predicting Human Card Selection in Magic: The Gathering with Contextual Preference Ranking Pablo Sauma-Chacón and Markus Eger Evaluating a Plan Recognition Agent for the Game Pandemic with Human Players Yifan Gao, Lezhou Wu and Haoyue Li GomokuNet: A Novel UNet-style Network for Gomoku Zero Learning via Exploiting Positional Information and Multiscale Features Karkala Hegde, Anssi Kanervisto and Aleksei Petrenko Agents that Listen: High-Throughput Reinforcement Learning with Multiple Sensory Systems	**Game Design** Micael Sousa, Nelson Zagalo and Ana Patrícia Oliveira. *Mechanics or Mechanisms: defining differences in analog games to support game design.* Freddy Reiber. *Major Developments in Tabletop Game Design.* Steven Brams and Mehmet Ismail. Fairer Chess: A Reversal of *Two Opening Moves in Chess Creates Balance Between White and Black.* Yiwen Zhang, Diego Monteiro, Hai-Ning Liang, Jieming Ma and Nilufar Baghaei. *Effect of Input-output Randomness on Gameplay Satisfaction in Collectable Card Games.*	**Virtual and Augmented Reality** Sebastian Cmentowski and Jens Krueger Effects of Task Type and Wall Appearance on Collision Behavior in Virtual Environments Filip Škola, Roman Gluszny and Fotis Liarokapis Do 3D Visual Illusions Work for Games and Virtual Environments Yue Hu, Meng Wang, Yingfeng Chen and Changjie Fan *A Future-Oriented Cache Management for Mobile Games*

Nethone ELYMPICS

Gaming is global, online and highly competitive.

As mobile gaming has soared in terms of popularity and capital invested, the industry has witnessed an increase in fraudulent behavior and cheating.

Elympics, a ML-based system, to detect fraudulent activities.

Elympics is designed to protect mobile tournament organizers and app developers by detecting technical and behavioral misconduct. It is a platform with an intelligent matchmaking system and anti-doping protection for mobile games.

The system collects information about each player's device configuration and networking using Nethone's proprietary profiler and combines it with gameplay characteristics. The anomaly detection models then process such feature vector to return a recommendation to the game service.

European Funds Smart Growth

The National Centre for Research and Development

European Union

Nethone Elympics is an R&D project funded by the National Centre for Research and Development from the European Smart Growth Fund.

Wednesday 18/08/2021

13:00-14:00 CET (Plenary)	Opening Vision: **Adaptive General Search Framework for Games and Beyond** Sponsored talk: **Elympics - Detecting doping in mobile e-sports by Jakub Karczewski (Nethone)**		
14:00-15:00 CET	**AI for Playing Games** Wael Al Enezi and Clark Verbrugge *Skeleton-based multi-agent opponent search* Christopher Bamford and Alvaro Ovalle *Generalising Discrete Action Spaces with Conditional Action Trees* Rongqin Liang et al. *Proximal Policy Optimization with Elo-based Opponent Selection and Combination with Enhanced Rolling Horizon Evolution Algorithm* Carl-Magnus Embring Klang, Victor Enhörning, Alberto Alvarez and Jose Font *Assessing Simultaneous Action Selection and Complete Information in TAG with Sushi Go!*	**Procedural Content Generation** Gianfranco Siracusa, Dylan Seychell and Mark Bugeja *Blending Output from Generative Adversarial Networks to Texture High-Resolution 2D Town Maps for Roleplaying Games* Daniel DeLaurentis, Jitesh Panchal, Ali Raz, Prajwal Balasubramani, Apoorv Maheshwari, Adam Dachowicz and Kshitij Mall *Toward Automated Game Balance: A Systematic Engineering Design Approach* Yeonghun Kim and Sunghee Choi *Beatmap extraction in rhythm game for procedural content generation using multiple object detection* Cameron Browne and Fabio Barbero *Heuristic Sampling for Fast Plausible Playouts*	**Virtual and Augmented Reality** Pratheep Kumar Paranthaman, Nikesh Bajaj, Nicholas Solovey and David Jennings *Comparative Evaluation of the EEG Performance Metrics and Player Ratings on the Virtual Reality Games* Diego Monteiro, Hao Chen, Hai-Ning Liang, Huawei Tu and Henry Duh *Evaluating Performance and Gameplay of Virtual Reality Sickness Techniques in a First-Person Shooter Game* Marc Mußmann, Samuel Truman and Sebastian von Mammen *Game-Ready Inventory Systems for Virtual Reality*
15:00-16:00 CET (Plenary)	Keynote by **Lana Sinapayen**		
16:00-17:00 CET	**AI for Playing Games** Alexander Dockhorn et al. *Multi-Objective Optimization and Decision-Making in Context Steering* Gautier Boeda *Extending the Goal Oriented Action Planner: Use Case in Character User Interaction* Dario Ostuni and Ettore Tancredi Galante *Towards an AI playing Touhou from pixels: a dataset for real-time semantic segmentation* Johannes Büttner and Sebastian von Mammen *Training a Reinforcement Learning Agent based on XCS in a Competitive Snake Environment*	**Procedural Content Generation** Miguel González-Duque, Rasmus Berg Palm and Sebastian Risi *Fast Game Content Adaptation Through Bayesian-based Player Modelling* Tianye Shu, Jialin Liu and Georgios N. Yannakakis *Experience-Driven PCG via Reinforcement Learning: A Super Mario Bros Study* Debosmita Bhaumik, Ahmed Khalifa and Julian Togelius *Lode Encoder: AI-constrained co-creativity*	**Game Studies and Narrative** Lucien Troillet and Kiminori Matsuzaki. *Analysing simplified Geister using DREAM.* Jérémie Humeau, Alexis Lebis, Mathieu Vermeulen and Guillaume Lozenguez. *Planning in the midst of chaos: how a stochastic Blood Bowl model can help to identify key planning features.* Devi Acharya, Michael Mateas and Noah Wardrip-Fruin. *Story Improvisation in Tabletop Roleplaying Games: Towards a Computational Assistant for Game Masters*
17:00-17:50 CET	**AI for Playing Games** Tyler Malloy, Tim Klinger, Miao Liu, Matthew Riemer, Gerald Tesauro and Chris R. Sims *Capacity-Limited Decentralized Actor-Critic for Multi-Agent Games* Cristina Guerrero-Romero and Diego Perez Liebana *MAP-Elites to Generate a Team of Agents that Elicits Diverse Automated Gameplay* Anssi Kanervisto, Christian Scheller, Yanick Schraner and Ville Hautamaki *Distilling Reinforcement Learning Tricks for Video Games*	**Procedural Content Generation** Nathan John-McDougall and Jeremy Gow *Adversarial Behaviour Debugging in a Two Button Fighting Game* Chathura Gamage, Matthew Stephenson, Vimukthini Pinto and Jochen Renz *Deceptive Level Generation for Angry Birds* Ziqi Wang, Jialin Liu and Georgios N. Yannakakis *Keiki: Towards Realistic Danmaku Generation via Sequential Generative Adversarial Nets*	**Game Studies** Leena Arhippainen and Paula Alavesa. *Karelian Language and Culture: a Qualitative User Study of Mobile and Web Games.* Sami Pohjolainen, Juho Mattila, Jarkko Tuovinen, Mikko Rajanen, Paula Alavesa and Leena Arhippainen. *Heuristic Evaluation of a Mobile Game Developed to Help Battle the Pandemic.* Daniel Cermak-Sassenrath. *Physically Active Games for the Cognitive Activation of Students.*

17:50-18:00 CET	Short Break		
18:00-19:00 CET	**AI for Playing Games** Anthony Harris and Siming Liu MAIDRL: Semi-centralized Multi-Agent Reinforcement Learning using Agent Influence Alessandro Sestini, Andrew David Bagdanov and Alexander Kuhnle Policy Fusion for Adaptive and Customizable Reinforcement Learning Agents Vadim Bulitko and Adi Botea *Evolving Romanian Crossword Puzzles with Deep Learning and Heuristic Search* Mark J. Nelson Estimates for the Branching Factors of Atari Games	**Game Theory** Amani Maina-Kilaas, George Montañez, Cynthia Hom, Kevin Ginta and Cindy Lay *The Hero's Dilemma: Survival Advantages of Intention Perception in Virtual Agent Games* Jesse Roberts *Finding an Equilibrium in the Traveler's Dilemma with Fuzzy Weak Domination* Daniel Ashlock and Andrew Dong *Representational Sensitivity for Divide the Dollar Playing Agents*	**Game Studies** Alesha Serada. *Vintage CryptoKitties and the Quest for Authenticity.* Luciana Lima, Camila Pinto, Patrícia Gouveia and Pedro Cardoso. *I Never Imagined That I Would Work In The Digital Game Industry.* David Antognoli and Joshua Fisher. *The Purposes and Meanings of Video Game Bathrooms*
19:00-20:00 CET	**AI for Playing Games** Alessandro Sestini, Andrew David Bagdanov and Alexander Kuhnle *Demonstration-Efficient Inverse Reinforcement Learning in Procedurally Generated Environments* Lucas Critch and David Churchill *Sneak-Attacks in StarCraft using Influence Maps with Heuristic Search* Yu Iwasaki and Koji Hasebe *Identifying Playstyles in Games with NEAT and Clustering*	**Game Theory** Dawson Crane, Zachary Holmes, Taylor Kosiara, Michael Nickels and Matthew Spradling *Team Counter-Selection Games*	**Transactions on Games and Abstracts** Martin Pichlmair and Mads Johansen *Designing Game Feel. A Survey.* Jose Font, Alberto Alvarez, Julian Togelius and Steve Dahlskog *Interactive Constrained MAP-Elites: Analysis and Evaluation of the Expressiveness of the Feature Dimensions* Leon Y Xiao, Laura L. Henderson, Yuhan Yang, Tullia Fraser and Philip W. S. Newall *Loot boxes in China: Sub-optimal compliance with probability disclosure law and novel links with gambling*

Thursday 19/08/2021

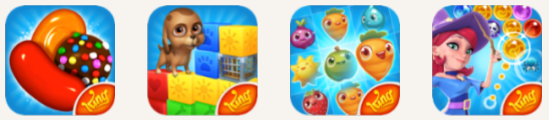
13:00-14:00 CET (Plenary)	Opening Vision: **The Social Responsibility of Game AI** Sponsored talk: **Daft Mobile**		
14:00-15:00 CET	**AI for Playing Games** Joshua Jung and Jesse Hoey *Distance-Based Mapping for General Game Playing* Siddharth Mysore, Bassel El Mabsout, Renato Mancuso and Kate Saenko *Honey, I Shrunk The Actor: A Case Study on Preserving Performance with Smaller Actors in Actor-Critic RL* *Domonkos Czifra, Endre Csóka, Zsolt Zombori and Géza Makai* *Towards solving the 7-in-a-row game*	**Procedural Content Generation** Chathura Gamage, Vimukthini Pinto, Cheng Xue, Matthew Stephenson, Peng Zhang and Jochen Renz *Novelty Generation Framework for AI Agents in Angry Birds Style Physics Games* Sam Earle, Maria Edwards, Ahmed Khalifa, Philip Bontrager and Julian Togelius *Learning Controllable Content Generators* Piotr Biczyk and Maciej Świechowski *Grail framework – a paradigm shift in implementation of advanced AI in games and automated quality control*	**AI for Novel Interaction** James Rucks and Nikolaos Katzakis. Camer AI: Chase Camera in a Dense Environment using a Proximal Policy Optimization-trained Neural Network. Michael Kolomenkin, Gil Shabat and Dvir Ben Or. DL-DDA - Deep Learning based Dynamic Difficulty Adjustment with UX and Gameplay constraints. Ying Zhu. A Theoretical Framework for Managing Suspense in Games. Stela Makri and Panayiotis Charalambous. Towards a multi-agent non-player character road network: a Reinforcement Learning approach.
15:00-16:00 CET (Plenary)	Keynote by **Petri Purho**		
16:00-17:00 CET	**AI for Playing Games** Pierre Le Pelletier de Woillemont, Rémi Labory and Vincent Corruble *Configurable Agent With Reward As Input: A Play-Style Continuum Generation* Sam Earle, Julian Togelius and Lisa Soros *Video Games as a Testbed for Open-Ended Phenomena* Diego Perez Liebana, Cristina Guerrero-Romero, Alexander Dockhorn, Linjie Xu and Jeurissen Dominik *Generating Diverse and Competitive Play-Styles for Strategy Games*	**Procedural Content Generation** Francesco Venco and Pier Luca Lanzi *An Agent-Based Approach for Procedural Puzzle Generation in Graph-Based Maps* Tamara Duplantis, Isaac Karth, Max Kreminski, Adam M. Smith and Michael Mateas *A Genre-Specific Game Description Language for Game Boy RPGs* Philip Bontrager and Julian Togelius *Learning to Generate Levels From Nothing*	**Human-Computer Interaction** Christian Arzate Cruz and Takeo Igarashi. *Interactive Explanations: Diagnosis and Repair of Reinforcement Learning Based Agent Behaviors.* Jessica Fritz and Johannes Fürnkranz. *Some Chess-Specific Improvements for Perturbation-Based Saliency Maps.* Filip Škola and Fotis Liarokapis. *BCIManager: A library for development of brain-computer interfacing applications in Unity.* Sorato Minami, Ken Watanabe, Naoki Saijo and Makio Kashino. *Amplitude of neural oscillations in the parietal area is associated with the results of esports competitions.*
17:00-17:50 CET	**AI for Playing Games** Michael Cook *Monte Carlo Tree Search With Reversibility Compression* Ercument Ilhan, Jeremy Gow and Diego Perez Liebana *Learning on a Budget via Teacher Imitation* Keisuke Tomoda and Koji Hasebe *Playing Geister by Estimating Hidden Information with Deep Reinforcement Learning*	**Procedural Content Generation** Anurag Sarkar and Seth Cooper *Dungeon and Platformer Level Generation and Blending using Conditional VAEs* **Analytics and Player Psychology (17:30)** Jeppe Theiss Kristensen, Arturo Valdivia and Paolo Burelli *Statistical Modelling of Level Difficulty in Puzzle Games*	**Human-Computer Interaction** Panayiotis Koutsabasis et al. *Field Playtesting with Experts' Constructive Interaction: An Evaluation Method for Mobile Games for Cultural Heritage.* Oladapo Oyebode, Anirudh Ganesh and Rita Orji. *TreeCare: Development and Evaluation of a Persuasive Mobile Game for Promoting Physical Activity.* Marjorie Ann Cuerdo, Anika Mahajan and Edward Melcer. Die-r Consequences: Player Experience and the Design of Failure through Respawning Mechanics.

17:50-18:00 CET	**Short Break**		
18:00-19:00 CET	**AI for Playing Games** Shengyi Huang, Santiago Ontañón, Christopher Bamford and Lukasz Grela *Gym-µRTS: Toward Affordable Deep Reinforcement Learning Research in Real-time Strategy Games* Yngvi Bjornsson, Sigurdur Helgason and Adalsteinn Palsson *Searching for Explainable Solutions in Sudoku* Zuozhi Yang and Santiago Ontañón *Contextual Combinatorial Bandits in Real-Time Strategy Games*	**Analytics and Player Psychology** Jason Bowey, Julian Frommel, Brandon Piller and Regan Manryk *Predicting Beliefs from NPC Dialogues* Átila Moreira, Francisco Ramos, Flávia Barros and Geber Ramalho *Economic Indicators for Decision-Making in Operating Massive Multiplayer Online Games* Hanna Kondratiuk and Rafet Sifa Swords, Data and Balls: Extracting Extreme *Behavioural Prototypes with Kernel Minimum Enclosing Balls* Haris Zacharatos, Christos Gatzoulis, Panayiotis Charalambous and Yiorgos Chrysanthou *Emotion Recognition from 3D Motion Capture Data using Deep CNNs*	**Natural Language Processing (Workshop)** 18:00 - Welcome 18:05 - The Propaganda Machine (Dulfer et al.) 18:25 - A Game Interface to Study Semantic Grounding in Text Based Models (Mickus et al.) 18:45 - Keynote 19:15 - Language Learning and gamification features (Hou et al.) 19:35 - Alignment of Language Agents (Piqueras et al.) 19:55 - Closing
19:00-20:00 CET	**AI for Playing Games** Zachariah Fuchs, Pavan Saranguhewa and Michael Ikuru *Real-Time Model Predictive Control for Shot Aiming in a Physical Pinball Machine* Keisuke Izumiya and Edgar Simo-Serra *Inventory Managament with Attention-based Meta Actions* *Henry Ward, Daniel Brooks, Dan Troha,* Bobby Mills and Arseny Khakhalin *AI solutions for drafting in Magic: the Gathering*	**Analytics and Player Psychology** Suvi K. Holm and Johanna K. Kaakinen *Game Dynamics Preferences Are Connected with Experiences Derived from First-Person Shooters* Enrica Loria, Alessia Antelmi and Johanna Pirker *Comparing the Structures and Characteristics of Different Game Social Networks - The Steam Case* Harro Tuin and Martin Rooijackers *Automatically detecting player roles in Among Us* Arturo Valdivia *Customer Lifetime Value in Mobile Games: a Note on Stylized Facts and Statistical Challenges*	

King - Cross Platform Casual Games

- King was founded in 2003; studios in Stockholm, London, Barcelona, Malmo and Berlin.
- The company has been part of Activision Blizzard since February 2016.
- King had 258 million monthly active users for the quarter (Q1 2021)
- We have developed more than 200 fun titles and our games can be played and enjoyed all over the world.

Global Franchises



Candy Crush | Pet Rescue | Farm Heroes | Bubble Witch

AI R&D at King

Content Production Automation

Maintain quality of content at scale and a good user experience.

- Examples: Playtesting, Content generation, Content tweaking

User understanding & In-Game user experience

Surface more relevant options to players to improve user experience.

- Examples: User session understanding, Deep clustering

ML Operations and Governance

Operate models at scale, accelare research and development, build models responsibly.

- Examples: Computation at scale, Model drifting, Explainable AI

Research Publications

Content Production Automation

1. F. Lorenzo et al. "**Generalized Reinforcement Learning for Gameplay**", RL in Games Workshop, AAAI 2021.
2. F. Lorenzo et al., "**Use All Your Skills, Not Only The Most Popular Ones**", IEEE COG 2020.
3. V. Volez et al., "**Capturing Local and Global Patterns in Procedural Content Generation via Machine Learning** ", IEEE COG 2020.
4. S.F. Gudmundsson et al., "**Human-Like Playtesting with Deep Learning**", IEEE CIG 2018.

User Understanding & In-game user experience

5. L. Cao, "**Simple, Scalable, and Stable Variational Deep Clustering**", ECML PKDD 2020.
6. L. Cao, "**Debiasing Few-Shot Recommendation in Mobile Games**", ORSUM workshop, ACM RecSys 2020.

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Friday 20/08/2021

13:00-14:00 CET (Plenary)	Opening Vision: **Procedural Content Generation: Better Benchmarks for Transfer Reinforcement Learning** Sponsored talk: **Playtika**		
14:00-15:00 CET	**Competitions** 14:00 - Chess fortresses, a causal test for state of the art Symbolic[Neuro] architectures 14:20 - VGC AI Competition - A New Model of Meta-Game Balance AI Competition 14:40 - Game State and Action Abstracting Monte Carlo Tree Search for General Strategy Game-Playing 14:50 - Interpretable Utility-based Models Applied to the FightingICE Platform	**Analytics and Player Psychology** Katelyn Grasse, Marjorie Cuerdo and Edward Melcer *Mad Mixologist: Exploring How Object Placement in Tangible Play Spaces Affects Collaborative Interaction Strategies* David Melhart, Antonios Liapis and Georgios N. Yannakakis *Towards General Models of Player Experience: A Study Within Genres* Lucy Wang *The Relationship between Personality, Game Motive, and Game Genre Preference: Gender as a Moderator* Mattia Colombo, Alan Dolhasz, Jason Hockman and Carlo Harvey *Psychometric Mapping of Audio Features to Perceived Physical Characteristics of Virtual Objects*	**Tutorial** Martin Balla, Marko Tot, Sam Devlin *Multi-Agent Reinforcement Learning in Minecraft: Malmo*
15:00-16:00 CET	15:00 - Carle's Game: An Open-Ended Challenge in Exploratory Machine Creativity 15:10 - Comfort break 15:40 - Introduction by Competition Chairs 15:45 - Carle's Game Competition 15:50 - Dota 2 5v5 AI Competition 15:55 - AI Snakes Competition 16:00 - AI Space Invaders Competition 16:05 - Bot Bowl III Competition	**Analytics and Player Psychology** Alex Cloud and Eric Laber *Variance Decompositions for Extensive-Form Games* Marko Tot et al. *What Are You Looking At? Team Fight Prediction Through Player Camera* Lincoln Costa, Rafael Mantovani, Francisco Souza and Geraldo Xexéo *Feature Analysis to League of Legends Victory Prediction on the Picks and Bans Phase* Rafet Sifa *Predicting Player Churn with Echo State Networks*	**Tutorial** Chris Bamford *Griddly: Building Single, Multiplayer and RTS games for Research*
16:00-17:00 CET	16:10 - ColorShapeLinks AI Competition 16:15 - Fighting Game AI Competition 16:20 - General Video Game AI: Single-Player Learning Competition 16:25 - Ludii AI Competition 16:30 - microRTS Competition 16:35 - StarCraft AI Competition 16:40 - Strategy Card Games AI Competition 16:45 - Angry Birds Level Generation 16:50 - Concluding remarks	**Analytics and Player Psychology** Luana Fragoso and Kevin Stanley *StABLE: Analyzing Player Movement Similarity Using Text Mining* Carolina Veloso and Rui Prada *Validating the plot of Interactive Narrative games* Arman Dehpanah, Muheeb Faizan Ghori, Jonathan Gemmell and Bamshad Mobasher *Evaluating Team Skill Aggregation in Online Competitive Games*	**Tutorial** Alexander Dockhorn, Diego Perez Liebana *Stratega: a general strategy games framework*

17:00-18:00 CET	**Demonstrations** Zahra Amiri, Yoones Sekhavat and Sakineh Goljaryan *KeepStep: Interactive Projection-mapping Based Exergames for People with Multiple Sclerosis* Kevin Frans *AI Charades: Language Models as Interactive Game Environments* Maël Ahmad Addoum, Maxime Rouffet and Eric Jacopin *3D Brawler Game Using a Hybrid Planning Approach* Maël Ahmad Addoum, Jannah Mekhaemar, Maxime Rouffet and Eric Jacopin *Khaldun: GOAP for both Procedural Level generation and NPC Behaviors*	**Analytics and Player Psychology** Robert Gray, Jichen Zhu and Santiago Ontañón *Multiplayer Modeling via Multi-Armed Bandits* Camilo Gordillo, Joakim Bergdahl, Konrad Tollmar and Linus Gisslen *Improving Playtesting Coverage via Curiosity Driven Reinforcement Learning Agents* Anurag Sarkar and Seth Cooper *An Online System for Player-vs-Level Matchmaking in Human Computation Games*	**Tutorial** James Goodman, Raluca Gaina: *Tabletop Games Framework for AI – easier implementation of modern card and board games*
18:00-18:30 CET (Plenary)	**Closing Remarks and Rewards**		

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