Denamganaï Kevin

PhD Researcher in Artificial Intelligence

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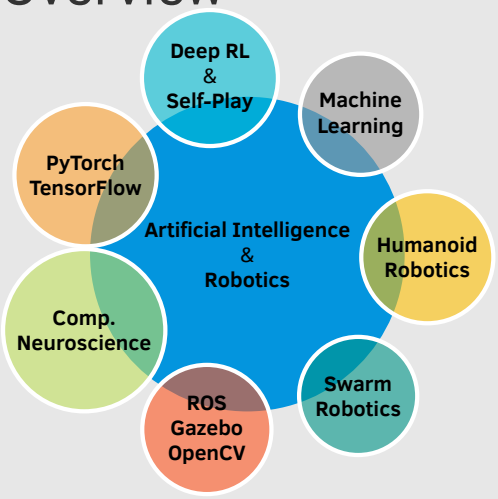
Near32

Overview



Programming

C • C++ • Python • LaTeX

C# • Java • Mathematica

Language

French - Native
English - Bilingual (**TOEFL 105**)
Japanese - Professional Proficiency
Spanish - Conversant
German - Conversant

Projects

ReferentialGym:
Language Emergence and Grounding in Referential Games.
Archi:
Modular and reconfigurable building blocks for Deep Learning applications.
Regym:
A Single-Agent and Multi-Agent / Self-Play Deep Reinforcement Learning framework.
RelationalReasoning:
Deep Relational Reasoning algorithms, using PyTorch.
PyTorch_VAE:
Replication of many Disentangling β-VAE variants following Higgins et al..
GazeboRL:
Deep Reinforcement Learning framework around ROS & Gazebo.
GazeboDomainRandom:
Domain Randomization tools following Tobin et al., for object recognition.
Core:
Computer Algebra System in C++.
HaRo:
3D printable MG995-based Raspberry Pi-powered humanoid robot.
EKF-DATMO:
Extended Kalman Filter-based solution to the DATMO problem.
SIMULATOR:
Rigid-body Physics Engine, and basic 3D Rendering Engine in C++ for Physics-based simulations.

Education & Research

2018 - Present
PhD Researcher, Intelligent Games and Game Intelligence (IGGI)
University of York, UK.

- **Thesis**: Emerging Languages as a Tool for Thought
- **Awarded 4 years funding from the EPSRC via IGGI.**
- Proposed a **nomenclature for Referential Games**, in its latest resurgence in deep learning, and implemented a PyTorch-based framework designed around it, entitled ReferentialGym.
- Investigating (artificial) **language emergence** and the (emerging) **systematicity** of the neural players of Referential Games.
- Investigating **zero-shot human-computer cooperation**, by proposing the Symbolic Behaviour Benchmark.
- Proposed ETHER (Emergent Textual Hindsight Experience Replay) to extend the Hindsight Experience Replay and investigate alignment between Emergent and Natural Languages.

2013 - 2017
Engineer Degree, Computer Science and Systems
Ecole Nationale Supérieure de l'Electronique et de ses Applications, France

2015 - 2017
Research MSc., Artificial Intelligence and Robotics
Université de Cergy-Pontoise, France

- **Thesis**: Visual Contexts for a Spatial Recognition System in Wide Environments
- Reviewed biologically-inspired robotic vision and focused on a neuronal architecture aiming at solving the online spatial recognition problem.
- Investigating a coarse-to-fine filtering scheme making use of hebbian-weighted adaptation and parallels visual information pathways integrated in a cognitive map.

2016 - 2017
MEng., Electrical Engineering and Information Science (GPA: 3.7/4)
Osaka Prefecture University, Japan

- **Thesis**: Adaptability Features in a Nonlinear System-based Swarm of Robots
- Proposed two obstacle avoidance behaviours designed as nonlinear system-based controllers in order to shore up the bridge between nonlinear systems and swarm robotics, following our laboratory's previous works.
- Investigating the synthesis potential of nonlinear system-based controllers with a deep learning-based controller in a deep reinforcement learning framework.

Certifications

2021 **Associate Fellowship of the HEA (AFHEA)**
⇒ **Portfolio**
- York Learning And Teaching Award Course

2015 **Autonomous Mobile Robots (AMRx)**
- Edx

2014 **Computational Neuroscience**
- Coursera

2017 **Deep Learning Foundation Nanodegree**
- Udacity

2015 **Underactuated Robotics (6.832x)**
- Edx

2014 **Autonomous Navigation for Flying Robots (AUTONAVx)**
- Edx

Experience

⋈ 2023 **6-months Research Internship** — **Sony Interactive Entertainment Europe**
An Inquiry into using **Emergent Language Abstractions** for better **Exploration in Reinforcement Learning**.

⋈ 2021-2022 **6-months Research Internship** — **Digital Creativity Labs**
Collaboration with Revolution Software to develop **Style Transfer** approaches for video game assets creation.

⋈ 2020-2023 **Graduate Teaching Assistant** — **University of York, Computer Science Dept.**
- Mathematical Foundations of Computer Science (COM00013C)
- Formal Languages and Automata (COM00014C)
- Multi-Agent Interactions & Games (COM00009H)
- Intelligent Systems 1: Search & Representation (COM00020I)
- Computability and Complexity (COM00023I)
- Introduction to Software and Systems Engineering (COM00019I)

⋈ 2016-Present **Artificial Intelligence & Robotics Freelancer** — **Upwork**
- On-screen 2D gaze pose tracking system for hand-held devices with **PyTorch**.
- Domain randomization tools using **MakeHuman** and **Blender**.
- Semi-supervised GAN for car make and model classification using **TensorFlow**.
- 3D bot-human interface, using **Blender** and **Panda3D**'s Python API.
- Development of Navigation & Planning algorithms for a Roomba-like robot, using **ROS** & **Gazebo**.

Publications

- K. Denamganaï, D. Hernandez, O. Vardal, S. Missaoui, and J. Walker, **ETHER: Aligning Emergent Communication for Hindsight Experience Replay**, preprint arXiv, 2023.
- K. Denamganaï, S. Missaoui, and J. Walker, **Visual Referential Games Further the Emergence of Disentangled Representations**, preprint arXiv:2304.14511, 2023.
- K. Denamganaï, S. Missaoui, and J. Walker. **Meta-Referential Games to Learn Compositional Learning Behaviours**, preprint arXiv:2207.08012, 2022.
- K. Denamganaï and J. Walker, **On (Emergent) Systematic Generalisation and Compositionality in Visual Referential Games with Straight-Through Gumbel-Softmax Estimator**, in *4th NeurIPS Workshop on Emergent Communication*, 2020.
- K.Denamganaï and J. Walker, **ReferentialGym: A Nomenclature and Framework for Language Emergence & Grounding in (Visual) Referential Games**, in *4th NeurIPS Workshop on Emergent Communication*, 2020.
- D. Hernandez, K. Denamganaï, S. Devlin, S. Samothrakis and J. A. Walker, **A Comparison of Self-Play Algorithms Under a Generalized Framework**, in *IEEE Transactions on Games (ToG)*, doi: 10.1109/TG.2021. 3058898.

- D. Hernandez, K. Denamganaï, Y. Gao, P. York, S. Devlin, S. Samothrakis and J. Walker, **A Generalized Framework for Self-Play Training**, in *Proceedings of the 2019 IEEE Conference on Games (CoG)*, pp. 1-8, 2019.
- K. Denamganai, T. Nakamura, N. Hara and K. Konishi, **"Obstacle avoidance control law for two-wheeled mobile robots controlled by oscillators"**, in *Proceedings of the 61st Annual Conference of the Institute of Systems, Control and Information Engineers (ISCIE)*, 221-4, 2017.
- K. Denamganai, T. Nakamura, N. Hara and K. Konishi, **"Coupled Kuramoto oscillator-based control laws for both formation and obstacle avoidance control of two-wheeled mobile robots"**, *IEICE Technical Report*, NLP2017-44, pp. 87-91, 2017.

Academic Services

⋈ 2023

- **AAAI Conference on Artificial Intelligence**
  ⇒ Role: Reviewer - 3 Papers
- **ICML : International Conference on Machine Learning**
  ⇒ Role: Reviewer - 5 Papers
- **NeurIPS Conference on Neural Information Processing Systems**
  ⇒ Role: Reviewer - 2 Papers

⋈ 2022

- **Emergent Communication Workshop** @ ICLR 2022
  ⇒ Role: Co-Organizer & Reviewer - 6 Papers
  ⇒ Co-Recipient of the Best Reviewer Award
- **ICML : International Conference on Machine Learning**
  ⇒ Role: Reviewer - 5 Papers
- **NeurIPS Conference on Neural Information Processing Systems**
  ⇒ Role: Reviewer - 4 Papers

⋈ 2021

- **NeurIPS Conference on Neural Information Processing Systems**
  ⇒ Role: Workshop Proposal Reviewer - 5 Applications