Matthieu Vilain

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French nationality
English fluent - German beginner

Machine Learning Researcher/Engineer

I am particularly interested in leveraging machine learning to deepen our understanding of the physical world and to enhance human interaction with the digital world.
Checkout my website for more details ! mattvil.github.io

EDUCATION

2020 - 2024
PhD in Machine Learning / Bordeaux University & IMS Laboratory, France
Title : *"Attention mechanism in deep learning for image matching".*
My research focuses on 3D computer vision, image matching, 3D scene understanding, pose estimation and the attention mechanism in vision.
Production:
- Paper *"Are Semi-Dense Detector-Free Methods Good at Matching Local Features?"*, M.Vilain, R.Giraud, H.Germain, G.Bourmaud, VISAPP 2024.
- Poster *"The attention mechanism in modern vision models"*, M.Vilain, Séminaire doctoral Bordeaux 2023.
- Talk *"From keypoints to dense image matching"*, M.Vilain, RFIA 2024.

2015 - 2020
Master in Data Science and Machine Learning / Cergy-Paris University & ENSEA, France
Main fields of study: Mathematics, Machine Learning, Software Engineering, Computer Vision, Algorithm and Data Structure, Robotics.
Associative commitment:
- Staff of the robotics club for 4 years and creator of the hackerspace of the university.

2019
Study abroad / San Francisco State University, USA
Main fields of study: Search Engines, Artificial Intelligence, Data Mining, Software Engineering, Neuro-Science.

RELEVANT EXPERIENCE

Machine Learning Research Intern / Thales, Palaiseau, France — Jul 2020 - Dec 2020
Designing ego-centric human-computer interaction through gesture-based control for AR headset interfaces
- Designed and implemented a machine learning solution combining skeletal analysis and spatio-temporal feature extraction to interpret body gestures and actions for augmented reality headset interfaces. (Python) (Pytorch)
- Optimized and deployed the algorithm on embedded boards, ensuring real-time performance and efficiency. (Jetson Nano/TX2) (Openvino)
- Co-authored a patent for the end-to-end system.

Machine Learning Developer / GAMEMAISTER, Paris, France — Jul 2019 - Aug 2019
Developing machine learning solutions for next-generation mixed reality board games
- Developed computer vision algorithms and machine learning models to perceive physical game elements and user interactions. (Python) (Tensorflow) (Tensorflow.js) (Multi-GPU)
- Designed and optimized AI algorithms to enhance game engine intelligence and real-time performance. (Game theory)

Machine Learning Research Intern / XXII, Paris, France — May 2018 - Sep 2018
Enabling efficient and adaptive ML models with specialized neural architecture search techniques
- Conducted research and development of novel machine learning algorithms for neural architecture search (NAS), optimizing architectures. for specific application contexts in computer vision. (Python) (Tensorflow) (CNN-LSTM) (Genetic algo) (Reinforcement learning)

Machine Learning Developer / Freelance, Paris, France — Jun 2017 - Jul 2017
Contributing to the foundation of a mixed reality gaming startup (GAMEMAISTER)
- Developed perception algorithms to enable accurate detection and interaction within the mixed reality board game ecosystem. (Theano)
- Automated processes to streamline development workflows. (Image processing) (C/C++) (Python)

PROJECTS

Main school projects

- **PerceptU:** Gesture-controlled TV interface capable of recognizing user emotions through audio and facial analysis.
- **Research:** Spiking neural network on event-based camera data for fall detection.
- **FaceKey:** Password manager based on facial recognition.
- **Research:** Use auto-encoders to learn object movements in an unsupervised way.

Main personal projects

- **Hackathon:**
  - **Enseack 2020,** smart embedded device for collaborative environmental health mapping. (2)
  - **RushHourMobility 2019,** AR glasses for smart navigation. (2)
  - **SFHacks 2019,** mobile app for retinal auto-diagnosis.
- **ARIEL2029:** Collaborated with CNES scientists to predict the chemical composition of exoplanet atmospheres using ML algorithm.
- **French Robotics Cup:** Machine learning guided robot.