GUILLAUME "VERMEILLE" SANCHEZ

Deep Learning & Computer Vision (PhD) | Software Engineering (MS)

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Facebook (Intern) · Google (Intern) · Hexaglobe (R&D Eng) · U. Toulon (PhD) · PyTorch / Torchvision · Docker · Python · C++14 · Linux · Torchélie (click here)

EXPERIENCE

Video Data Extraction — Hexaglobe

March 2018 – Ongoing · Paris, FR

- A **face detection** and **face recognition** system for unconstrained facial pose, videos up to 20min, with several hundreds of pre-known identities, at production scale (15k videos to analyze per day, less than 5% of false positives), using an original loss for training with negative unlabeled samples (paper to be written) and YOLO.
- Working on **enhancing old videos** (up to 2006) and graphics with Deep Neural Networks, using ESRGAN.
- Creating a **recommender system** and on **activity recognition** (10 classes) for our domain's popular activities.

Language Research Workshop — JSALT 2019

2019 · Montreal, QC

Attended JSALT 2019 as a PhD student. Worked on **discovering discrete elements** (letters, phonemes, etc.) inside of sequential data (handwritten text, spoken utterances). Led to a NeurIPS workshop publication and IJCNN publication on VQ-VAEs.

Software Eng. (OAuth2, infra) — Orange

2016 – 2018 · Nice, FR

Wrote an **OAuth2 provider** in Python3 based on JWT (JSON Web Token), integrated with Kong (API Gateway). Solved an internal Kong **bug in the DNS resolver** (in Lua, click here).

NLP Eng. Intern — Facebook

2015 · Menlo Park, CA

Developed a framework for **Command a Control** almost from scratch based on Naive Bayes and Hidden Markov Models for an internal R&D showcase. The dataset was small (few hundred of utterances), for 10 actions.

Compilation Eng. Intern — Google

2015 · London, UK

Improved Android's Dex2oat / **ART compiler**. Various optimizations: 40% speed up on MonteCarlo benchmark with '**division by integral constants**' algorithm, fixed **ARM opcodes generation** for long integers division, improved types handling and **null detection** by 10%.

Software Eng. Intern — Facebook

2013 · Palo Alto, CA

Wormhole: wrote a dynamic **multisource multithreaded config manager** for a distributed stateless environment.

MACHINE LEARNING

CV / Image Processing
Face Detection, Keypoint Estimation, Face Recognition, Video Analysis

Recommender Systems
Videos recom- mendations, mitigating cold start.

Generative Models
Face generation with VQ-VAE, GANs

Torchélie
Includes VQ-VAEs, GANs, Optimizers, models, etc., used for my PhD.

SOFTWARE ENG.

Production
Versioning with Git and DVC, HTTP with Flask, ship with Docker, build with Make, maintaining code with CI and MyPy. On Linux.

Torchélie
Personal Deep Learning library with training loops, layers, models, production utils, hyper parameters search, etc.

Programming Language Theory
Compiler theory, assembly (x86, ARM)

TEACHINGS & TALKS

Algorithms · DL for Art · DL and security · Functional programming · C++11 · Good programming habits · Python · Compilers · Haskell · Parallel algorithms

EDUCATION

PhD in Machine Learning & Computer Vision — U. of Toulon

March 2018 – May 2022

M.S. Computer Science — EPITA

Sept 2010 – August 2016

KEY OPEN SOURCE CONTRIBUTIONS

- Torchélie. It supports my Deep Learning endeavours, in both my thesis and industrial work.
- Submitted: Unicode TR49 for CPython (C++/Python)
- Bugfix in Kong's DNS client (Lua)
- Clang-Callgraph, a tool to inspect a C++ codebase interactively
- Performance improvements in dlib with GPU and thread parallelism
- Wrote batched recognition in ageitgey/face_recognition
- Yet another Neural Artistic Style Transfer implementation (Gatys' algorithm, Python). It includes some personal tweaks.

SCIENTIFIC MOTIVATIONS

- **Usefulness.** First and foremost, I care about applied science bringing power to people and value to companies. I like finding ways to apply machine learning on new domains and use cases.
- **Training interesting models on convenience hardware.** Just like anyone can create new tools or app, anyone should be able to train interesting models. I am more interested in small models than large ones.
- **Training models faster** for shorter development cycles. Our contribution Łańcucki et al. 2020 trains VQ-VAEs faster. An improved version is in Sanchez 2022.
- **Using smaller and / or cheaper data sets.** Current training sets are either too large (in fully unsupervised training) or too costly to annotate (in supervised training) for individuals. Sanchez 2022 trains face recognition models with most of the data remaining unlabeled. Sanchez et al. 2020 investigates training on noisy labels.
- **World awareness.** I believe that 3D sensing and SLAM are the next big leaps technology needs, enabling AR / VR, autonomous cars and robotics.
- **Waking dormant data.** As side projects, I like to think about how Machine Learning can be used to index old photographs, enhance them to current quality standards, or fix disappointing shots. Sanchez 2022 explores face reconstruction and manipulation with VQ-VAEs and recommender systems for old data.

PUBLICATIONS

Thesis

- Sanchez, Guillaume (2022). "Creating and exploiting metadata for video content recommendation". PhD thesis.

Conference Proceedings

- Łańcucki, Adrian et al. (2020). "Robust Training of Vector Quantized Bottleneck Models". In: *2020 International Joint Conference on Neural Networks (IJCNN)*. IEEE, pp. 1–7.
- Sanchez, Guillaume et al. (2020). "Deep learning classification with noisy labels". In: *2020 IEEE International Conference on Multimedia & Expo Workshops (ICMEW)*. IEEE, pp. 1–6.
- Chorowski, Jan et al. (2019). "Unsupervised neural segmentation and clustering for unit discovery in sequential data". In: *NeurIPS 2019 workshop-Perception as generative reasoning-Structure, Causality, Probability*.

PERSONAL STUFF

Medical Vision Contest
2018, ranked 3rd in knee injury detection in radiographies, JFR's Data Challenge, opponents were startups and professionals.

Computational Art
Used Deep Learning and especially Leon Gaty's Neural Artistic Style, reimplemented in Torchélie, with some personal tweaks to make the algorithm more stable. Also played with Shadertoy and music generation from bit patterns.
IG: 0x4rt

Teaching
I love teaching and talking about the things I am interested in. I gave classes and talks during my software engineering school, been a teacher for a while after my graduation, gave a few talks at Orange, and taught classes during my PhD program.

Core Values
I believe that science and technology should help mankind spending more time with their loved ones and or for doing the things they love. I believe in engineering as the greatest form of art and creativity. More than anything I love coding because it allows me to do incredible things with just a computer.

Puzzle Solver
Nothing keeps me as awake and motivated as a good challenge, puzzle or sheer curiosity. I wrote a nonogram solver just because it sounded fun. I wrote my own CUDA powered Deep Learning framework with autodiff, or YOLO, just in order to learn how they work, from the ground up. I submitted a PR to Python for text centering that brought me to the UTF-8 standard, compression, and automaton, and made a talk out of it, because that was of an unsuspected and fun complexity.

Singing
Been singing rock and metal for 15 years. Made a few gigs in my teenagehood.

Roleplaying Games
Running a Dungeons & Dragons 5e homemade campaign for 2 years, session every two weeks.