Jeronim Matijević

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Personal Profile

Graduate student at the Faculty of Electrical Engineering and Computing, Zagreb enrolled in the Computer Science MSc programme. Passionate about neural networks for all purposes, with years of experience in training models for various tasks.

Fields of interest:

- computer vision, generative models, neural radiance fields, depth estimation

Generally I find models linking the gap between natural language processing and computer vision fascinating. MLOps is also something i find very interesting

Education

Faculty of Electrical Engineering and Computing *Zagreb, Croatia*

MSc in Computer Science *Sept 2018 - Current*

- Courses worth mentioning: Deep Learning, Neural networks, Artificial Intelligence, Machine Learning, Natural Language Processing, Statistical Analysis of Data, Advanced Algorithms and Data Structures, Scripting languages, Pattern Recognition, Computer Graphics, Theory of Computing

Faculty of Electrical Engineering and Computing *Zagreb, Croatia*

BSc in Computer Science *2015 - 2018*

- Bsc Thesis: Method for counting people in sequences of images: **youtube clip**

III. Gymnasium, Split *Split, Croatia*

High School *2011 - 2015*

- Participated in math, physics and programming competitions at various levels

Work Experience

Faculty of Electrical Engineering and Computing *Zagreb, Croatia*

Young Researcher on the SOVA project *March 2022 - March 2023*

- This project was a collaboration between academia and industry. We helped develop solutions for inventory management in retail environments using computer vision. **project website**
- Studied the state of the art in depth estimation, neural radiance fields and oriented bounding box detection
- Used my novel evaluation metric to significantly reduce the memory footprint of my network.
- Defined my master's thesis which will focus on adding additional channel features to images with hopes of improving object detection networks
- I have also guided a fellow student working on his graduate project

AI Technologies, d.o.o. *Zagreb, Croatia*

Student Computer Vision Engineer *April 2021 - September 2021*

- Worked on a proof-of-concept project as a computer vision engineer
- Goal of the project was detection of broken insulators on powerlines. Data was gathered from drones.
- The pipeline I constructed took the high quality videos from the NAS disk, downscaled their resolution/FPS and sent them into a insulator detection network. Then it extracted those insulators from the high quality video frames we started from. Those high-resolution insulator images were then sent to a classification network which decided if they were broken or not. All the broken insulators and the ordinal number of the transmission tower were stored in a csv file.
- Closely coordinated with my colleagues who worked as annotators in order for us to have the best possible data

Skills

Python	Pytorch (mostly), tensorflow and jax, Detectron2, XGBoost, tensorboard, wandb, torchscript, openCV, skimage, kornia, sklearn, numpy, pandas, requests, multiprocessing, os, shutil
Programming	instant-ngp, docker, ffmpeg, , bash, Java, C/C++, rudimentary SQL/NoSQL
Miscellaneous	Linux(6 years, on laptop + dual boot on PC), LaTeX(Overleaf), CVAT, git. nginx (with chatgpt), WeakAuras

University/Hobby Projects

A world of warcraft fishing bot using computer vision

Hobby

- This was a project I made for fun, I wanted to make a world of warcraft fishing bot using computer vision. The version that used openCV for detecting the fishing bobber didn't work all that well so I created a small dataset of 150ish (probably way too many) labeled pictures and trained the yolov3 network to detect it. The results were much better than standard computer vision algorithms for object detection.
- Check out the github repository here: **repo link**

Projected GAN for art generation

Hobby

- This project was done for the huggan huggingface event. I used the wikiart dataset and trained the projected GAN on it, I also trained/transfer learned a couple of models to my friends' paintings that all contained small houses
- Check out the demo here: **huggingface space**

Method for People Counting From Image Sequence

Bachelor Thesis, mentor: Sven Lončarić

- I located people in a single image using the tinyface detector (it was clearly the best of all methods we observed (at that time)) and then developed an algorithm that created trajectories and followed/counted people from frame to frame in a video.
- Check out the short demo here: **youtube video**

Music genre classification from lyrics

Text Analysis and Retrieval course project

- We had a dataset composed of 250k song lyrics and their respective genres. The part I worked on was creating a tfidf weighted fasttext vector from the top 10 ranked words in the song, and then finding the best classification algorithm. To no one's surprise, it was XGBoost
- You can check out the project report here: **Project Report**

Pix2pixGAN for generating facial expressions

Neural Network course project

- We made an implementation of the pix2pix architecture which was trained on an neutral facial expression image, an image with some emotion, and the corresponding emotion vector, the results were surprisingly good. Network inputs were: face image with neutral expression + emotion encoded in a vector output: face image with drawn emotion
- You can check out the **Project Report** (This one is in Croatian)

Fine-tuning english GPT-2 for rap lyric generation

Hobby

- This project was done during for the huggingface jax flax community week workshop. I scraped genius.com using their API to create the dataset we used. Model training was done on a v3 TPU on google cloud which was provided to us as a part of the workshop. The results were ok it was interesting to see how it captured the usual theme of the rapper's songs (e.g. Tupac vs Lauyrn Hill)
- Check out the demo here: **huggingface space**

Retinal fluid segmentation using 2D U-net

Graduate project

- This was done as my graduate project, the dataset I had was the same one used in the **Retouch Challenge**. Experimented with different/new loss functions and observed how the end result changes with respect to the loss function with interesting results

Using ESRGAN for achieving superresolution

Seminar Course

- Studied GANs and how they could be used for superresolution in images, and various difficulties the traditional approach had in achieving superresolution

Awards and honors

Croatian national high school physics competition 2014,

Open days, an all-day event where our University welcomes high school students and displays various demos to them. I setup a stable diffusion notebook and let them have fun with it.

Languages and hobbies

English Fluent

Croatian Native

Hobbies Working with PC hardware, music, video games, bouldering, film,

References available upon request.