

Computer Vision for 2D Animation

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**UNIVERSITAT POLITÈCNICA
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CROMAI

Computational Resources Orchestration
and Management for AI

Introduction

- BIMAI (Barcelona Image and Artificial Intelligence Lab)
- AI, Computer Vision and image/video synthesis
 - Focus on visual arts
- Algorithms
 - Emphasis on non-mainstream creative flows (e.g. traditional 2D animation, educational materials, indie videogames, etc.)
- Computational performance
 - AI inference workflows and deployment on commodity hardware

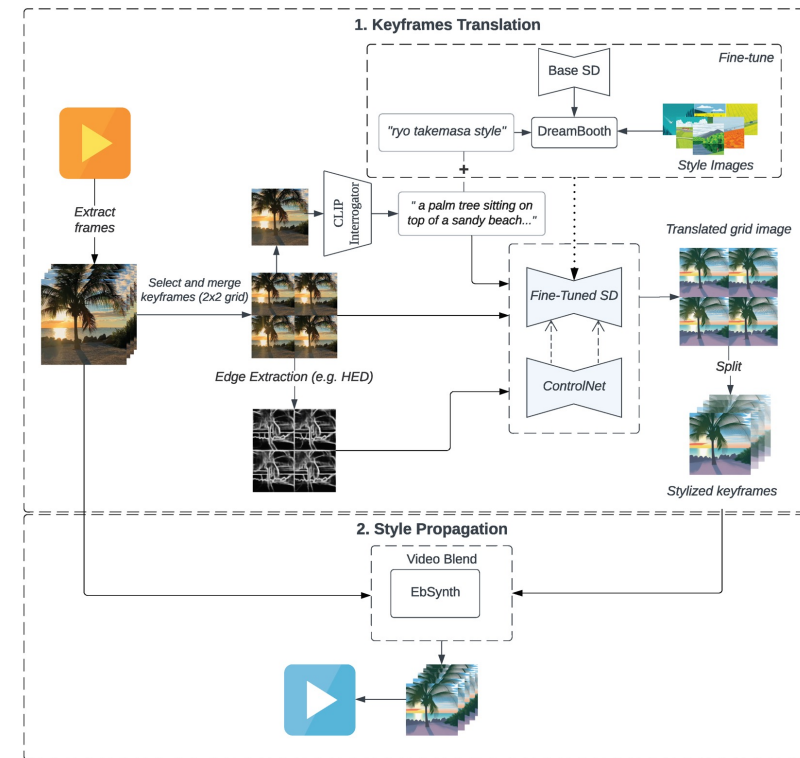
#video-to-animation

Temporally Coherent Video Cartoonization for Animation Scenery Generation



Sunset Over the Rice Fields
Ryo Takemasa

Demos: <https://github.com/gustavorayo/video-to-cartoon>



[4] Gustavo Rayo and Ruben Tous. Temporally Coherent Video Cartoonization for Animation Scenery Generation. Electronics, 13(17), 3462. **2024**

Rotoscoping through 3D Human Pose Estimation

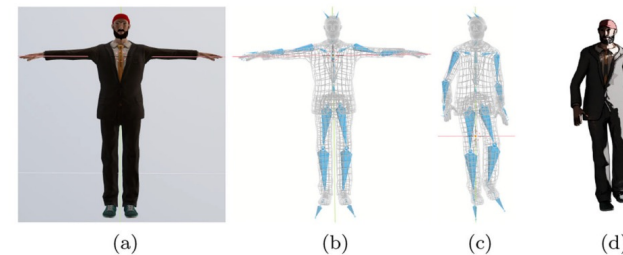
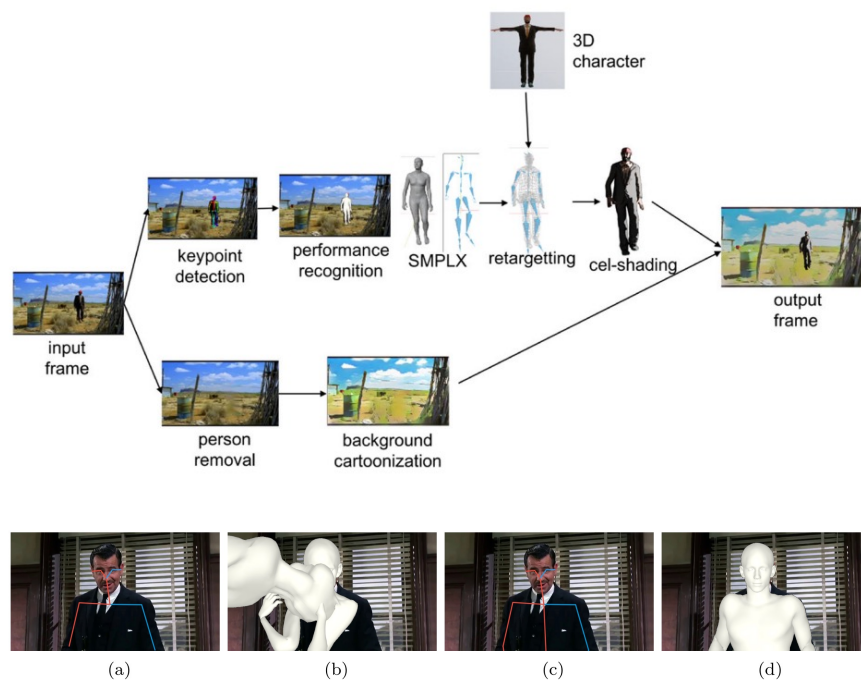


Fig. 5 Pose retargeting. (a) 3D Mixamo character, (b) Rigged with the SMPL-X skeleton, (c) posed, (d) cel shaded

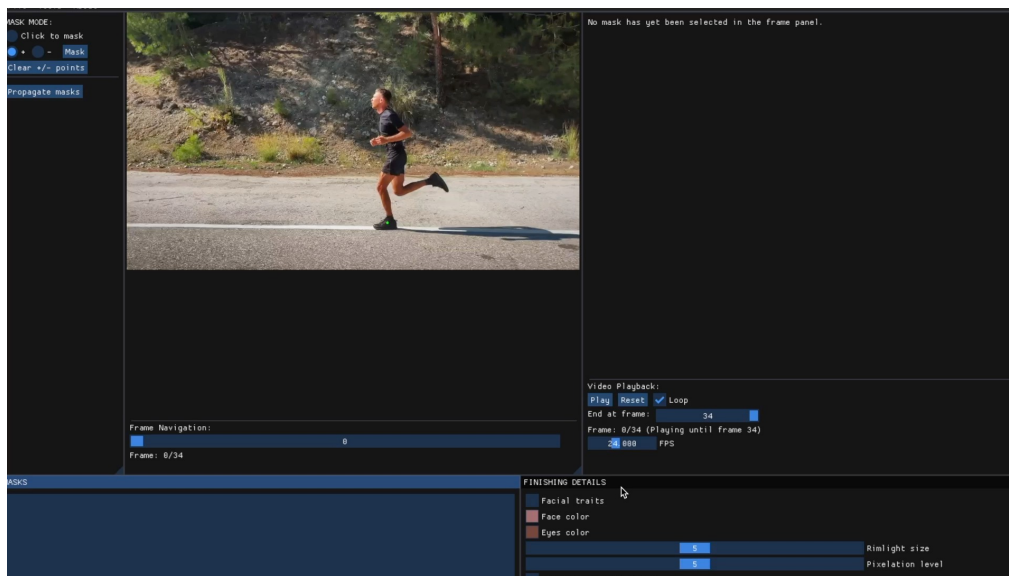


[1] Ruben Tous. Pictonaut: Movie Cartoonization Using 3D Human Pose Estimation and GANs. Multimedia Tools and Applications volume 82, pag. 21101–21115 (2023). **2023**

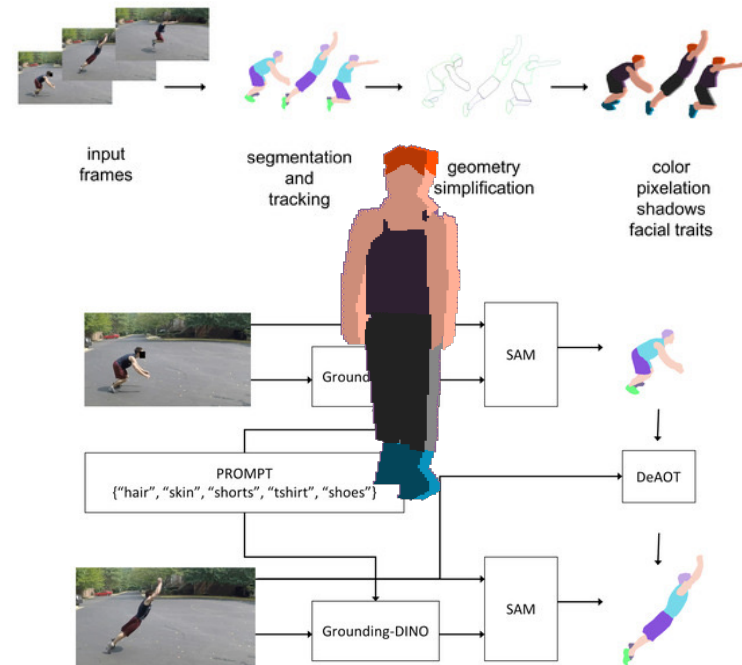
[2] Ruben Tous, Jordi Nin and Laura Igual. Human Pose Completion in Partial Body Camera Shots. Journal Of Experimental & Theoretical Artificial Intelligence. July **2023**.

[3] Beatriz Gomes, Ruben Tous. A 3D Pipeline for 2D Pixel Art Animation. **2023**

Lester: Rotoscope Animation Through Video Object Segmentation and Tracking



Project page: <https://github.com/rtous/lester>

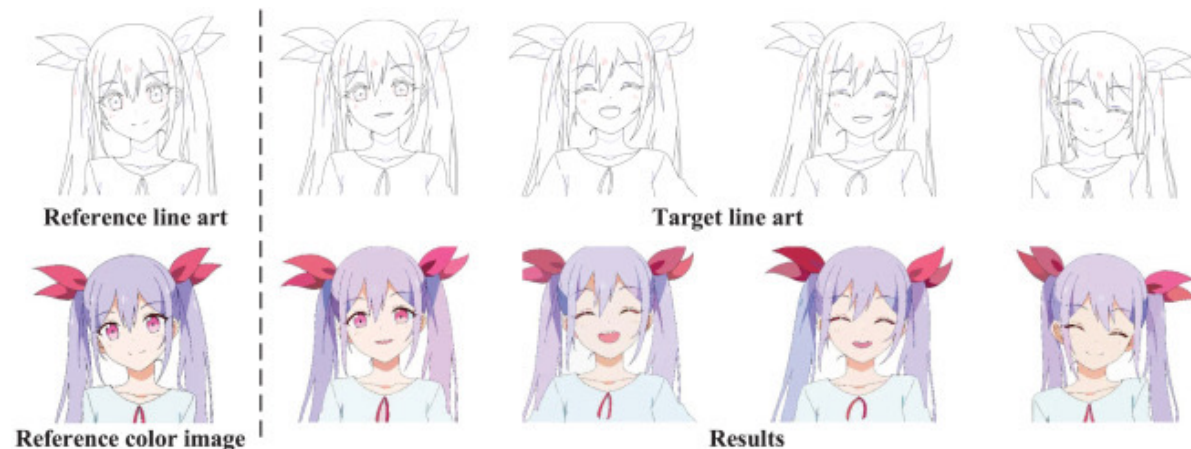


[5] Ruben Tous. Lester: Rotoscope Animation through Video Object Segmentation and Tracking. Algorithms 17, no. 8: 330. **2024**

#line-art

2D Animation In-betweening

- Reference-based animation line-art colorization
- **Lack of groundtruth data**
 - Typically projections of 3D clips



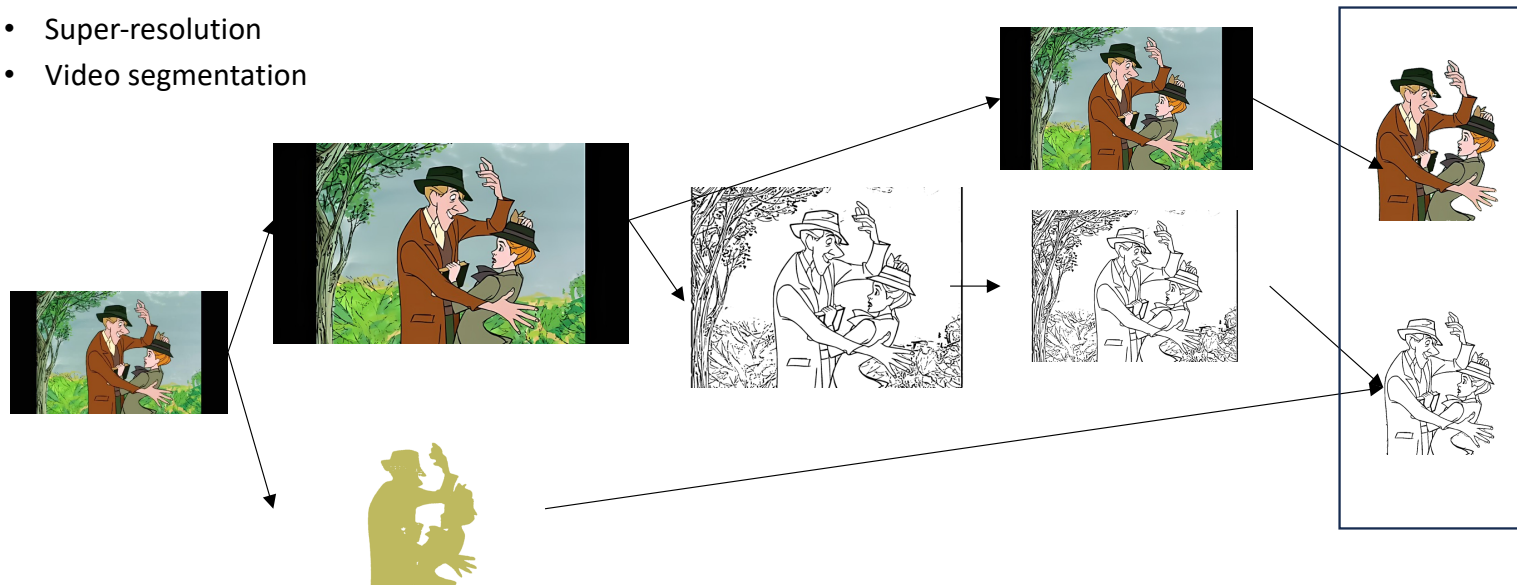
[6] Judith Caldés, Ruben Tous, Beatriz Otero. Quality Assessment of State-of-the-Art 2D Animation Interpolation. Technical report. **2024**

[7] Maria Bertolin, Ruben Tous. Reference-based Animation Line-Art Colorization. Technical report. **2025**

[8] Rosa Ceano , Ruben Tous. Automatic Line Art Extraction from 2D Color Cartoons and Animations. Technical report. **2025**

Line-art extraction

- Novel line-art extraction method combining:
 - Super-resolution
 - Video segmentation



[6] Judith Caldés, Ruben Tous, Beatriz Otero. Quality Assessment of State-of-the-Art 2D Animation Interpolation. Technical report. **2024**

[7] Maria Bertolin, Ruben Tous. Reference-based Animation Line-Art Colorization. Technical report. **2025**

[8] Rosa Ceano , Ruben Tous. Automatic Line Art Extraction from 2D Color Cartoons and Animations. Technical report. **2025**

#efficiency

Deploying Vision Foundation AI Models on the Edge. The SAM2 Experience

- Segmentation Anything Model 2 (SAM2)
 - Released by Meta on summer 2024
 - Promptable video segmentation
- SAM2 Migration to C++
- 6 ONNX models
- 3000 lines of pipeline Python code
- Performance evaluation
- Comparison with cloud depl.
- Accuracy evaluation

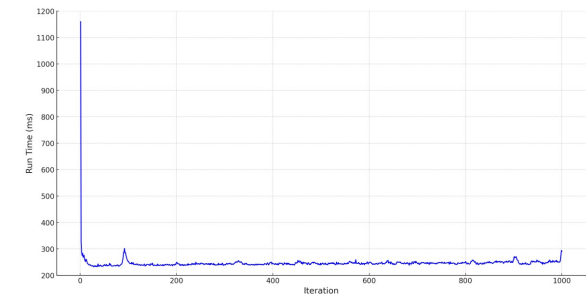
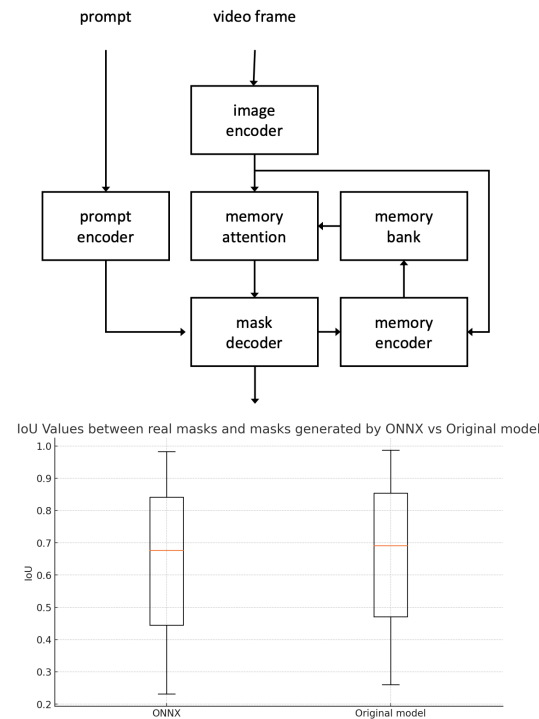


Figure 3: Execution Time on a Local Machine

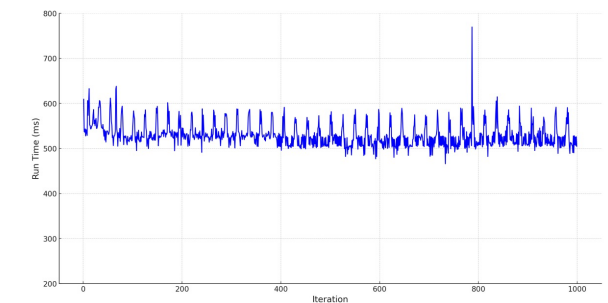
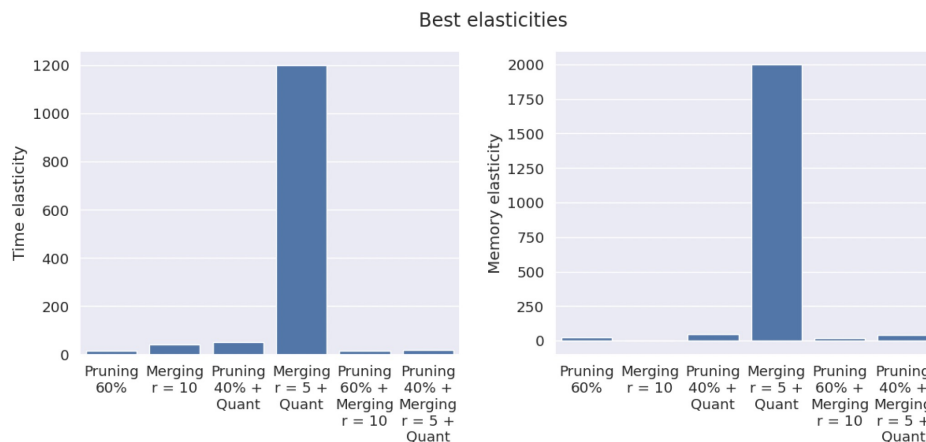


Figure 4: Execution Time in a Cloud Environment

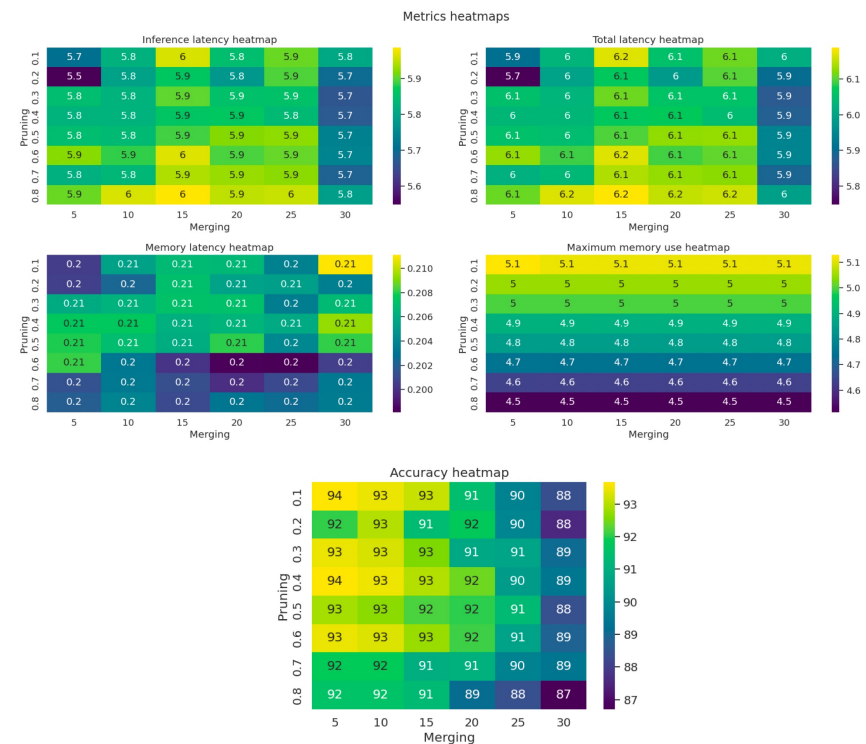
[9] Zheshuo Lin, Ruben Tous and Beatriz Otero. Deploying Vision Foundation AI Models on the Edge. The SAM2 Experience. Proceedings of the 18th International Work-Conference on Artificial Neural Networks (IWANN 2025). A Coruna, Spain, June 16-18, **2025**.

Efficient Vision Transformer Inference on Edge Devices

- ViT + Quantization, knowledge distillation, token merging, and pruning
- Individual techniques and their combinations
- latency-accuracy and memory-accuracy trade-offs

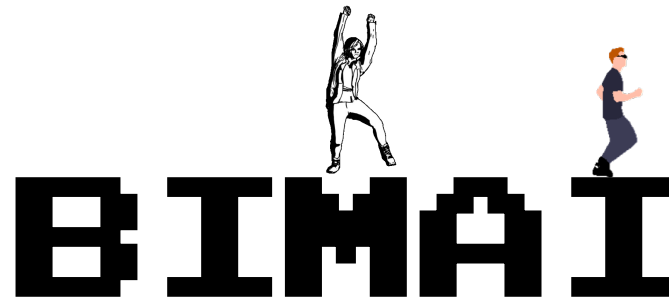


Pruning + Merging + Quantization



[10] Aleix Armero, Efficient Vision Transformer Inference on Edge Devices. Technical report. **2025**

<https://bimailab.github.io/>



Barcelona Image and Artificial Intelligence Lab

CONTRIBUTORS:

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