

INTERNSHIP PROPOSAL

TL SAS <input type="checkbox"/>	Lab : ISL	TA : Content Processing	Explo : YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>
Internship supervisor(s) : Claire-Hélène Demarty			
Admin assistant : Laurence Piquet			
Preferred Schools (if any) :			
Required Study Level : Master 2			
Theme of internship			
<input type="checkbox"/> Computer graphics <input checked="" type="checkbox"/> Video processing <input type="checkbox"/> Human computer interaction <input checked="" type="checkbox"/> Computer vision <input type="checkbox"/> Networking <input checked="" type="checkbox"/> Machine Learning & Deep Learning			
Desired starting month : January - March 2018		Duration (in months) : 6	
Possibility to pursue with a Ph.D. Thesis? YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>			
Name of proposed intern (if any) :			

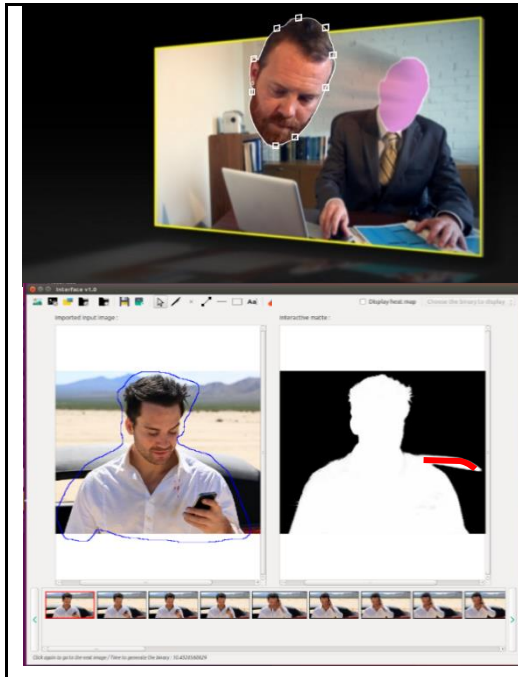
Tutor signature	TA Leader Signature	Lab Manager Signature

(Thanks for completing the internship description on page 2 and to add a pic in the right format)



Title of internship: Deep Learning for Rotoscoping

Summary of the internship (for Technicolor internship offer web page).



Very recently deep learning approaches allowed developing very efficient approaches in various fields (e.g., image/video processing, computer vision, audio processing). This internship proposal targets the development of deep learning approaches for high-end visual effects. In this context, both the interaction with a user (roto artist) and the efficient propagation of the effect throughout a whole sequence are keys to achieve both a highly accurate and efficient process. The proposal will target these two aspects, interaction and spatio-temporal propagation in the context of deep learning segmentation and matting methods. Resulting algorithms might be integrated in a professional VFX software to help the colorists.

Skills: machine learning, deep learning, computer vision, video/image processing, PyTorch, TensorFlow or Keras deep learning frameworks, Python or C++.

Keywords: machine learning (deep learning), video processing, computer vision, interaction, segmentation, tracking, rotoscoping, matting.

Detailed description

Context
<p>Within the Image Science Laboratory at Technicolor R&I Rennes (https://research.technicolor.com/rennes/), this internship is proposed in the Technical Area “Content Processing” gathering more than 20 researchers, engineers, PhDs, and Postdocs coming from 10 different countries. The main line of research in the team is to understand, organize, and enhance content, both professional and user-generated.</p>
Objective
<p>In the past years deep learning has considerably gained in popularity and was applied to various tasks of multimedia analysis, processing and generation. The goal of this internship is to develop new deep learning-based approaches for high-end visual effects. More precisely, the internship will be held under the umbrella of a project targeting to develop tools that would highly simplify the video rotoscoping process. The rotoscoping process consists in extracting an object of interest from its background in order to replace this background by another one in final compositing, and it is usually performed manually by roto artists. Hence, rotoscoping is an interactive editing process which requires a large amount of processing time as the requested segmentation accuracy is critical. As such, the global goal of the Technicolor project is to propose new interactive video editing tool that would help the artists to accelerate and improve the rotoscoping. In this context, the internship will focus on two axes: 1/ investigate how interactions from a user can be leveraged to improve a deep learning based rotoscoping process 2/ investigate how to propagate the rotoscoped results on one frame to a whole video sequence via deep learning propagation techniques. Both axes may also be highly correlated as they may intervene in a recursive manner.</p>
Task description



What is expected from this internship can be divided in:

- Studying relevant state of the art on interaction in the context of deep learning and on temporal propagation (e.g., deep tracking) in the context of deep learning. In particular the different types of interaction might be investigated (strokes, clicks, sketches, etc.).
- Collecting and/or creating a relevant dataset that will serve for both the training and the evaluation.
- Designing and implementing deep learning architectures that leverage different types of user interaction for e.g., the tasks of segmentation and/or matting.
- Improve the above architectures with deep learning propagation techniques
- Evaluating the proposed deep learning methods on the relevant benchmarks and comparing them with other state of the art methods
- In case a successful solution is achieved, integrating the architecture into the corresponding VFX plugin within the project

As outputs of this internship, a paper submission to an international conference, and a potential integration of one final solution into the plugin would be expected.

Working environment

Technicolor is an industry leader in the production of video content for movies, TV, advertising, games and more. The company provides production, postproduction, and distribution services to content creators, network service providers and broadcasters. Technicolor is driving innovation in 3D movie making, 3D entertainment experiences for the home, automatic meta-data creation, second screen experiences, media management and the digital home of the future.

Technicolor Research Rennes is the largest Technicolor Research Center conducting research in various domains applying to the creation, management and delivery of digital content.

Our innovations fuel Technicolor’s technology and services, and at the same time our researchers publish papers in the top academic conferences. We actively collaborate with numerous universities around the globe. We welcome post-docs, visiting faculty, PhD students and numerous graduate student interns to come and spend time with us in our lab for periods of time from 3 to 36 months. Our interaction with our academic partners enables the continuous flow of creative ideas into Technicolor’s research directions and technology transfer efforts.