DEEL
DEpendable & Explainable Learning
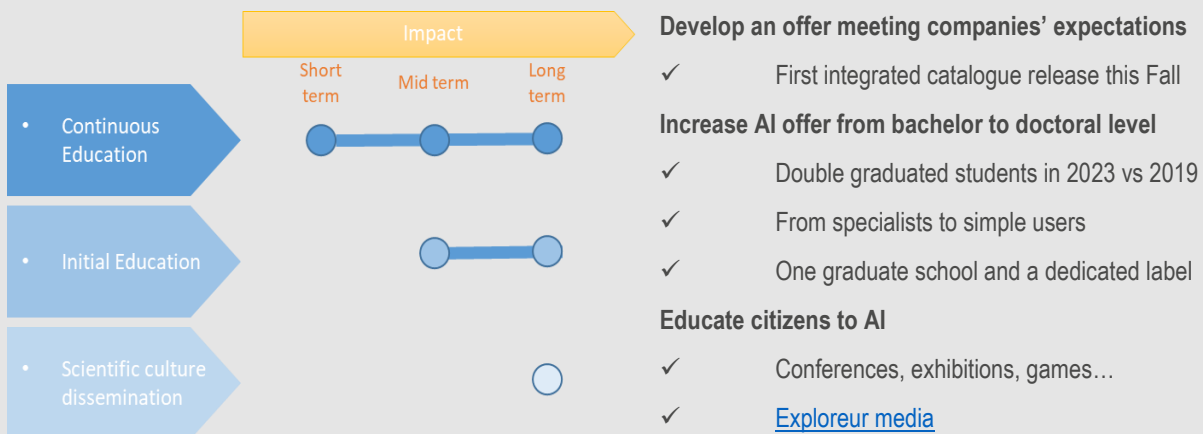
DEEL MAG #05

TOULOUSE & QUEBEC JOIN FORCES TO DEVELOP AI FOR CRITICAL SYSTEMS

SNAPSHOT ON ANITI EDUCATION PROGRAM

Among the **3 missions of ANITI, EDUCATION holds a special place.**

Through this mission we will indeed address a wide range of the society, from kids to adults, from scholars to workers, on both short and long terms perspective.

One objective: ensure the availability of the right competencies to support the development of AI.

Develop an offer meeting companies' expectations

✓ First integrated catalogue release this Fall

Increase AI offer from bachelor to doctoral level

✓ Double graduated students in 2023 vs 2019

✓ From specialists to simple users

✓ One graduate school and a dedicated label

Educate citizens to AI

✓ Conferences, exhibitions, games…

✓ Exploreur media

A strong focus on diversity

Diversity is recognized as a pre-requisite for a fair AI.

ANITI is especially involved in gender diversity and has created a dedicated working group gathering representatives of all categories of people involved in ANITI. **You can be part of it!**

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 # Nicolas VIALLET

📅 KEY DATES

Project Contract	The DEEL Contract has been signed by all members
Certification Mission	The next workshops : 26 & 27th August * 24 & 25th September
Les Carrefours DEEL	1st edition : 1st october

LEARNING DISENTANGLED REPRESENTATIONS FOR NEURAL NETWORK INTERPRETABILITY

The field of computer vision is currently dominated by **deep and complex neural networks** that are impossible to decipher, hence the name "**black-box model**". To overcome this flaw, we applied a state-of-the-art neural network model – the β-TCVAE – that can create disentangled representations through unsupervised learning. The final embedding separates the underlying structure of the data into different dimensions, each corresponding to an interpretable factor of the data.

We focused on its application to the Components dataset provided by Airbus. Ideally, we would have a model that discovers and separates into different dimensions how to rotate, mirror, morph between types of components and change the amount of pins (in the case of integrated circuits). Since we train the model without supervision, it is not easy to perfectly separate these transformations. Figure 1 shows an example of representations with only 6 latent variables, and we can clearly see the meaning of some of them.

Rudolf Lipschitz

The feature extractor part of the model can then be used for other applications, such as classification or regression, and still retain its interpretability if left untouched when applying transfer learning techniques.

In future work, we will test other variations of this kind of model to improve the **stability of the representation with respect to the network initialization and its application to other DEEL datasets**.

 # Agustin Martin PICARD, David VIGOUROUX, Mikaël CAPELLE, Adrien GAUFFRIAU

COLLABORATIVE TOOLS, DATASETS MANAGEMENT & OPEN-SOURCING

In order to facilitate research and development within the DEEL project, various collaborative tools are available to the team: a Gitlab instance to host projects under version-control systems such as git, a Nextcloud instance to share files and edit documents in a collaborative way, and a Mattermost instance to facilitate communications. The Gitlab and Nextcloud instances can also be used to share specific documents or git projects with external partners or collaborators. As of today, the Gitlab instance hosts almost 70 projects, and the Nextcloud is already used to share outcomes with the DEEL COMOPS members.

The Gitlab instance also hosts the DEEL dataset manager. The dataset manager is a python library written for the DEEL project to simplify the access to the DEEL datasets. The manager allows anyone from the DEEL Core team to access the datasets used for research within the project. The manager can also be used to give access to specific dataset to additional collaborators, such as the ACAS-Xu dataset for members of the DEEL Certification team or even external collaborators when needed. The manager currently allows easy access to 8 datasets, including the ACAS-Xu dataset for the Certification challenge, the Blink dataset from Renault or the Components dataset from Airbus. The manager can also be used to access external datasets used for the DEEL project, such as the EuroSAT or MVTEC datasets. We provide the manager as a correctly packaged python library that anyone with access to the project on Gitlab can easily install. Figure 1 shows how easily it is to access the Components dataset using the manager.

Figure 1 - Accessing the components dataset using the manager

When possible and relevant, projects from Gitlab are **open-sourced** and published on GitHub with an **MIT License.** Open-source DEEL repositories can be found under the deel-ai organization on Github. The first DEEL open-source project, **deel-lip**, was published in June 2020 at https://github.com/deel-ai/deel-lip.

 # Mikaël CAPELLE, Thibaut BOISSIN