

## THE PROBLEM ADDRESSED

Medical images (CT, MRI, Xray) are not normalized nor calibrated. Therefore, pixel intensity values cannot be compared directly between two scans.

Today, clinicians adjust image contrast interactively on their display console. This is subjective, not reproducible, and not practical for large image cohorts.

MIDWAY can calibrate contrast between sets of images (2 to thousands).

Method initially patented for automated quantification of tumor growth on longitudinal pairs of brain MRIs (with CNRS and Univ. Paris Cité).

## TECHNOLOGY

MIDWAY++ is a specialized algorithm based on an explicit mathematical model to match image histograms to a “Midway” target, defined from a population of scans.

Midway-mapped images enable:

- Direct comparison of pixel intensity values;
- Computation of informative “Difference maps”
- Automated characterization of lesion growth (e.g. tumors)

- Training more robust Deep-Learning segmentation networks.
- Transferring Deep-learning models to new medical image cohorts more easily.

## COMPETITIVE ADVANTAGES

- Enhanced radiological interpretation of images by healthcare professionals.
- More robust transfer of Deep-Learning architectures to new image cohorts.
- Explainable and tunable for new use-cases or new cohorts.
- Light-computational overhead (no cloud computing)
- Unique solution of its kind.

## APPLICATIONS

- Computer-based aided diagnostic (**CAD**) for **radiology**.
- Harmonization of medical image cohorts for **Deep-learning**.
- **Versatile** solution for multiple use-cases: brain tumors follow-up with MRI, mammography, lung CT scans.

## DEVELOPMENT STATUS

- TRL 6 for Brain Tumor MRIs: Deployable tool already validated and patented.
- TRL 4 for other use cases (Xray, CT)

## INTELLECTUAL PROPERTY

- METHOD OF QUANTIFYING THE EVOLUTION OF PATHOLOGIES INVOLVING CHANGES IN BODY VOLUMES, IN PARTICULAR TUMORS (FR2946171B1 et EP 107244089)
- Code submitted to APP (sept 2023)

## INVENTORS & CONTACTS

- Elsa ANGELINI, Professor at Telecom Paris  
[elsa.angelini@telecom-paris.fr](mailto:elsa.angelini@telecom-paris.fr)
- TTO: [valorisation.transfert@telecom-paris.fr](mailto:valorisation.transfert@telecom-paris.fr)

## PUBLICATIONS

Angelini ED, Delon J, Bah AB, Capelle L, Mandonnet E. *Differential MRI analysis for quantification of low grade glioma growth. Medical image analysis.* 2012;16(1):114-26.

## LOOKING FOR

- expanding to new use cases
- co-development with industrial partners
- Investors to launch startup