LIFEx v7.6.0: a software with enhanced functionalities to support reproducible radiomic and AI studies in multimodal imaging

LIFEx soft — Local Image Feature Extraction

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What is LIFEx ?
Local Image Feature Extraction

LIFEx graphical user interface in which a sample of protocols can be seen on the top (Radiomic feature extraction protocol, Metabolic Tumor Volume – MTV protocol, Labelling protocol, Calcium quantification protocol, etc). VOIs automatically segmented using the MTV protocol are shown in color. The display includes a Maximum Intensity Projection view (left) as well as the axial, coronal and sagittal slices.
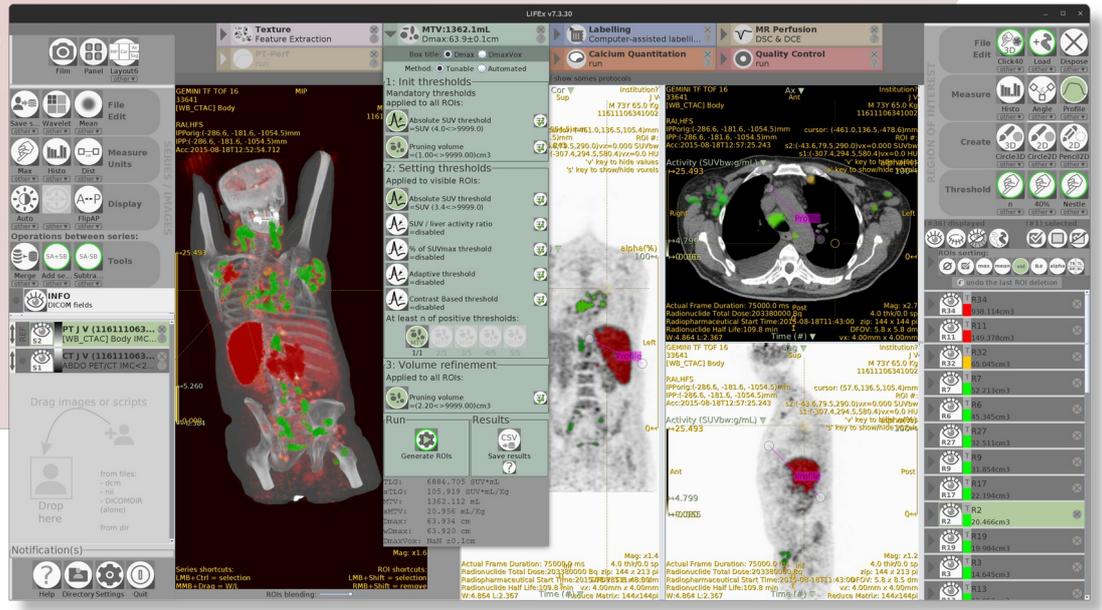
Download ► the software

lifexsoft.org

Purpose

LIFEx is a **free and well documented software** for automatic measurement of a large number of features characterizing tissue properties from medical images.

LIFEx has been especially designed for **radiologists, nuclear medicine physicians, oncologists**, and **scientists** involved in *in vivo* medical imaging (no programming skills required).

LIFEx: a freeware for radiomic feature calculation in multimodality imaging to accelerate advances in the characterization of tumor heterogeneity. C Nioche, F Orlhac, S Boughdad, S Reuzé, J Goya-Outi, C Robert, C Pellot-Barakat, M Soussan, F Frouin, and I Buvat. Cancer Research 2018; 78(16):4786–4789

Development strategy

LIFEx complies with the Image Biomarker Standardisation Initiative (IBSI) guidelines by **providing access to 306 histogram, textural and shape indices**. The correct implementation of radiomic feature calculation has been thoroughly checked using IBSI benchmarks. Novel experimental and validated radiomic features have also been implemented.

A careful follow-up of advances in the field and fruitful interactions with users guide LIFEX developments.

New needs in terms of image annotation for supervised learning: A practical annotation module has been developed (Labeling Tool) to meet new needs in image annotation for supervised machine learning.

Image Biomarker Standardisation Initiative. Zwanenburg A et al. Radiology 2020 and Whybra et al Radiology 2024

New biomarkers

Recently introduced biomarkers, such as the normalized distance from hotspot to centroid reflecting tumor aggressiveness, are now available in LIFEx. Total Metabolic Tumor Volume from PET/CT images can be easily calculated using a dedicated protocol, including a practical one-click interactive tool to add or remove any high-uptake region from the Maximum Intensity Projection views. When multiple lesions are present, various disease dissemination biomarkers can be automatically calculated.

N. Hovhannisyan-Baghdasarian, M. Luporsi, N. Captier, C. Nioche, V. Cuplov, E. Woff, N. Hegarat, A. Livratowski, N. Girard, I. Buvat, F. Orlhac. New promising candidate prognostic biomarkers in [18F]FDG-PET images: evaluation in independent cohorts of NSCLC patients. J Nucl Med 2024 in press

Radiomic maps

Feature maps are computed using a 3×3×3 voxels kernel and the result is assigned to the central voxel of this window in the resulting 3D feature map.

This process is repeated for all features and all voxels inside the ROI.

Voxel-wise supervised analysis of tumors with multimodal engineered features to highlight interpre-table biological patterns. T Escobar, P Pineau, S Vauclin, F Orlhac, C Nioche, L Champion, H Brisse, I Buvat. Med Phys 2022
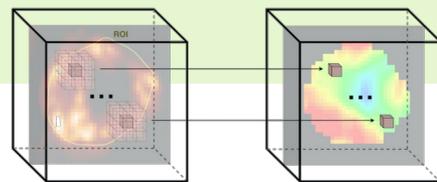
Time line ▶

2016 — First release

2018 — *The Best of* THE AACR JOURNALS — A COLLECTION OF THE MOST-CITED RESEARCH ARTICLES

2020 — Prix unicancer de l'innovation (6e édition)

2024 — Newly created website user accounts for downloads : 7 800 users

Publications referencing LIFEx