




QUINT workflow

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 Quantify and localize features in histological rodent brain section images

TECHNOLOGY DESCRIPTION

The QUINT workflow enables the quantification and spatial analysis of labelled features in histological images of rodent brain sections based on reference atlases of the brain. It utilises three open-source software tools. The first – *ilastik* - allows machine learning based extraction of labelled features in the images. The second – *QuickNII* - generates atlas maps customised to match the proportions and cutting plane of the brain sections. The third – *Nutil* – enables quantification and spatial analysis of features by drawing on the output of *ilastik* and *QuickNII*. In combination, the tools facilitate semi-automated quantification, eliminating the need for more time consuming methods such as stereological analysis with manual delineation of brain regions.

The QUINT workflow is suitable for large-scale analysis of histological image data from the brain.

As the quantifications are performed in regions defined by a reference atlas, the region definitions are standardized, allowing comparisons of data from different laboratories.

AREAS

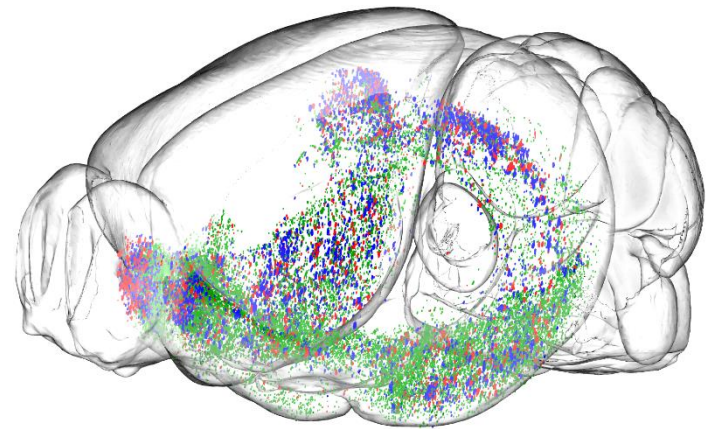
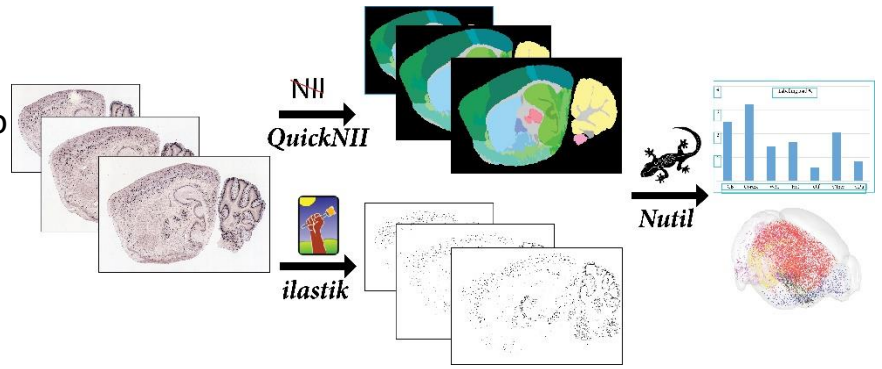
Image Analysis | Quantification





COMPETITIVE ADVANTAGES

- The QUINT workflow is rapid compared to stereology, user-friendly and does not require coding aptitude to operate.
- All three tools bring together the essential information for quantification: atlas ROI, objects, and count.
- By drawing on 3D reference atlases for the region delineations, outputs are made directly comparable allowing integration and comparison of results from different laboratories.
- Reference atlases currently incorporated:
 - Allen Mouse Brain Atlas (CCFv3, 2015 and 2017)
 - Waxholm Atlas of the Sprague Dawley rat (v2 and v3).



The workflow generates reports and coordinate files for visualizing the features in 3D reference atlas space

APPLICATION & MARKET POTENTIAL

- The QUINT workflow enables comparative studies of rodent brains.
- The tools and workflows are open access
- Used in the context of the EU Human Brain Project.
- Tested by several laboratories outside of the HBP, including the Korea Brain Research Institute (Daegu) and the Kaczorowski Lab at The Jackson Laboratory (Bar Harbor).

TECHNOLOGY READINESS LEVEL



REFERENCES

Yates SC, Groeneboom NE, Coello C, et al. & Bjaalie JG (2019) QUINT: Workflow for Quantification and Spatial Analysis of Features in Histological Images From Rodent Brain. *Front. Neuroinform.* 13:75. doi: 10.3389/fninf.2019.00075

Berg S, Kutra D, Kroeger T, et al. & Kreshuk A (2019) ilastik: interactive machine learning for (bio)image analysis. *Nat Methods.* 16:1226-1232. doi: 10.1038/s41592-019-0582-9.

<https://www.nitrc.org/projects/nutil/>

<https://www.nitrc.org/projects/quicknii>

<https://www.ilastik.org/>

CONTACT

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