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Protocol status: Working
We use this collection and it's working

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Regional Mouse Brain Analysis (Modified QUINT)

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DISCLAIMER

This collection of protocols was written in the Henderson lab, but all software and original protocols were developed and are available through the NeuroImaging Tools and Resources Collaboratory (NITRC).

ABSTRACT

This is series of protocols that has been adapted from published and unpublished protocols broadly referred to as the QUINT workflow. Note that the original QUINT workflow was generated by Yates and colleagues, and all credit for development of these programs goes to that team. References for each software is listed below.

Yates, S. C. et al. QUINT: Workflow for Quantification and Spatial Analysis of Features in Histological Images From Rodent Brain. Frontiers in neuroinformatics 13, 75, doi:10.3389/fninf.2019.00075 (2019).

Puchades, M. A., Csucs, G., Ledergerber, D., Leergaard, T. B. & Bjaalie, J. G. Spatial registration of serial microscopic brain images to three-dimensional reference atlases with the QuickNII tool. PloS one 14, e0216796, doi:10.1371/journal.pone.0216796 (2019).

VisuAlign, RRID:SCR_017978

1. QuPath: https://qupath.github.io/
2. QuickNII: https://www.nitrc.org/projects/quicknii (SELECT ABA Mouse Edition)
3. Visualign: https://www.nitrc.org/projects/visualign/
4. Qmask: \\pn.vai.org\projects_secondary\henderson\NOAH\QMask-Standalone
5. Nutil: https://www.nitrc.org/projects/nutil/

ATTACHMENTS

812-2118.pdf

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COLLECTION integer ID: 90668

Keywords: QUINT, Segmentation, Registration, non-linear warp transformation

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GUIDELINES

Purpose

The purpose of this workflow is to enable mouse brain segmentation, registration and quantification of regional signal. The simplest segmentation is done in QuPath because this program handles whole slide images and has good segmentation algorithms. Registration is done using 3 programs: QuickNII (aligns to a 3D atlas, typically the 2017 CCFv3 Allen Brain Atlas), Visualign (allows for non-linear warp transformation of the atlas to match sections), QMask (masks each side of the brain to allow for bilateral assessment of brain regions). Segmentations and registrations are then brought together in Nutil, enabling the generation of quantitative measures for every region of the brain.

Necessary Programs and Locations

1. QuPath: https://qupath.github.io/
2. QuickNII: https://www.nitrc.org/projects/quicknii (SELECT ABA Mouse Edition)
3. Visualign: https://www.nitrc.org/projects/visualign/
4. Qmask: \\pn.vai.org\projects_secondary\henderson\NOAH\QMask-Standalone
5. Nutil: https://www.nitrc.org/projects/nutil/

Folder Organization

The programs for registration and quantification rely on having exact file paths from which to call the data. Therefore, it is easiest to set these folders up from the beginning. We have the following typical layout for folders:

1. Project (e.g. Tau-MLi-2)
    a. Figure (e.g. Figure 23)
        i. Repeat (e.g. 1 or 2)
            1. Cohort/Block (e.g. TM1)
                a. QuPath (place for qupath project and exported
                b. QVN (for QuickNII, Visualign, Nutil)
                    i. Atlas
                    ii. Input
                    iii. Mask
                    iv. Output_Left
                    v. Output_Right
    b. Figure (next one, same internal folder organization)…

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ATTACHMENTS

812-2118.pdf

FILES

Protocol

NAME
QuPath Visualization/Segmentation

VERSION 1

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Protocol

NAME
QuickNII Brain Atlas Registration

VERSION 1

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Protocol

NAME
QMask Hemispheric Separation

VERSION 1

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Protocol

NAME
Visualign

Transformation

VERSION 1

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Protocol

NAME

Nutil Data Integration

VERSION 1

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Protocol

NAME

QUINT Workflow Appendix

VERSION 1

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Protocol

NAME

QUINT Workflow for Fluorescence

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