

NEUROXIV USER INSTRUCTION

neuroXiv

2022-05-31

v1.3

Summary

In neuroxiv.net, users can:

- Search neurons of interest by neuron anatomy, morphology, and connectivity patterns.
- Explore morphology and connectivity features of neurons of interest.
- Upload neuron (swc file or eswc file) and calculate the morphology features.
- Search similar neurons.
- Explore the 3D visualization of neurons.
- Explore the cross species atlas.

View stats of neuron of interest

In the neuron analysis panel, user can view the stats of neurons of interest. The neurons of interest are listed on the neuron list panel on the right.

The screenshot displays the neuroXiv web interface. At the top, there is a navigation bar with the neuroXiv logo, search options (Search, Search by id, Upload neuron), a dropdown menu set to 'fMOST', and a 'Switch atlas' button. The main content area is divided into several panels:

- Neurons viewer:** Contains a 'basic information' sidebar on the left with a 'number of neurons' section listing various brain regions and their neuron counts (e.g., CP: 1698, MOs: 682, SSs: 376, VPM: 345, MOp: 534, PIR: 414, fiber tracts: 382, SSp-m: 376, SSp-bfd: 345, VISp: 319).
- Neurons analysis:** The central panel features an 'Arbor Distribution' heatmap. The x-axis represents 'Arbor length' (7500, 15000, 22500, 30000) and the y-axis represents 'Distal arbor ratio' (0, 0.25, 0.5, 0.75, 1). A 'Neuron feature plot' is overlaid on the heatmap. A tooltip for a specific neuron provides details: brain region id: CP, celltype id: CL, arbor length: 23156.46, distal arbor ratio: 1.00, and number of neurons: 11 of 12.
- Single neuron info:** Located on the right side of the analysis panel, it contains two histograms: 'dendrite_center shift' and 'dendrite_average contraction'.
- Neuron list:** A vertical list on the far right shows a 'List of neurons of interest' with individual neuron thumbnails, their brain region (e.g., MOs, CLA, MOp), and analysis options (axon, bouton, dendrite, soma).

Select neurons of interest to analyze

User can select neurons from the list to analysis.

The screenshot displays the neuroXiv web interface for neuron analysis. At the top, there are search and upload options. The main area is divided into a 'Neurons viewer' on the left and a 'Neurons analysis' section on the right. The 'Neurons analysis' section features an 'Arbor Distribution' scatter plot and two bar charts: 'dendrite_center shift' and 'dendrite_relative center shift'. The scatter plot shows the distribution of neurons across various brain regions, with size and color representing arbor length and distal arbor ratio. The bar charts show the distribution of these metrics for selected neurons. On the right, a list of neuron reconstructions is shown, each with a small image and a set of controls for selection and analysis.

2. Click analysis to see the result.

1. Check the neurons of interest. Can select across pages

Arbor Distribution

Arbor length: ● 7500 ● 15000 ● 22500 ● 30000 Distal arbor ratio: ● 0 ● 0.25 ● 0.5 ● 0.75 ● 1

dendrite_center shift

Value	Count
27.45	1
28.44	1
29.68	1
30.91	1
35.49	4

dendrite_relative center shift

Value	Count
0.32	1
0.33	1
0.35	1
0.37	1
0.39	4

dendrite_average contraction

dendrite_average bifurcation angle remote

View information and visualization of a neuron

In the neuron list, users can see basic information of each neuron. Detailed information and 3D visualization of each neuron can be viewed by clicking info button in the list.

The screenshot displays the NeuroXiv web application interface. At the top, there is a navigation bar with the 'neuroxiv' logo, search options, and institutional affiliations (Tencent AI Lab and Southeast University). The main content area is divided into three sections:

- Left Sidebar:** Contains a 'Neurons viewer' tab with an 'info' button circled in red. Below it, a 'viewer property' section shows basic information for a specific neuron, including its ID (AIBS_17109_1801_x6998_y12550_IMOST), brain region (Aid), registration atlas (fMOST), layer (6), and nearby morphological and anatomical data.
- Center:** A 3D visualization of a neuron, labeled 'Neuron data 3D visualization'. The neuron is shown in red and blue, with a 'hide dendrite viewer' button at the bottom right.
- Right Panel:** A 'Neurons analysis' section with a 'Single neuron info' tab circled in red. It features a list of neurons, each with a small thumbnail and a set of buttons for 'Aid', 'fMOST', 'axon', 'bouton', 'dendrite', and 'soma'. A blue 'Info' button is present for each neuron. A callout box points to one of these 'Info' buttons, indicating that clicking it leads to the detailed neuron information.

Additional callouts include a grey box on the left sidebar stating 'Feature table of the neuron viewed' and a grey box in the center stating 'Neuron data 3D visualization'. A grey box on the right panel states 'List of neurons to be viewed'.

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User can control the 3D display of the brain regions, neurons, as well as the slices of the brain in the left column.

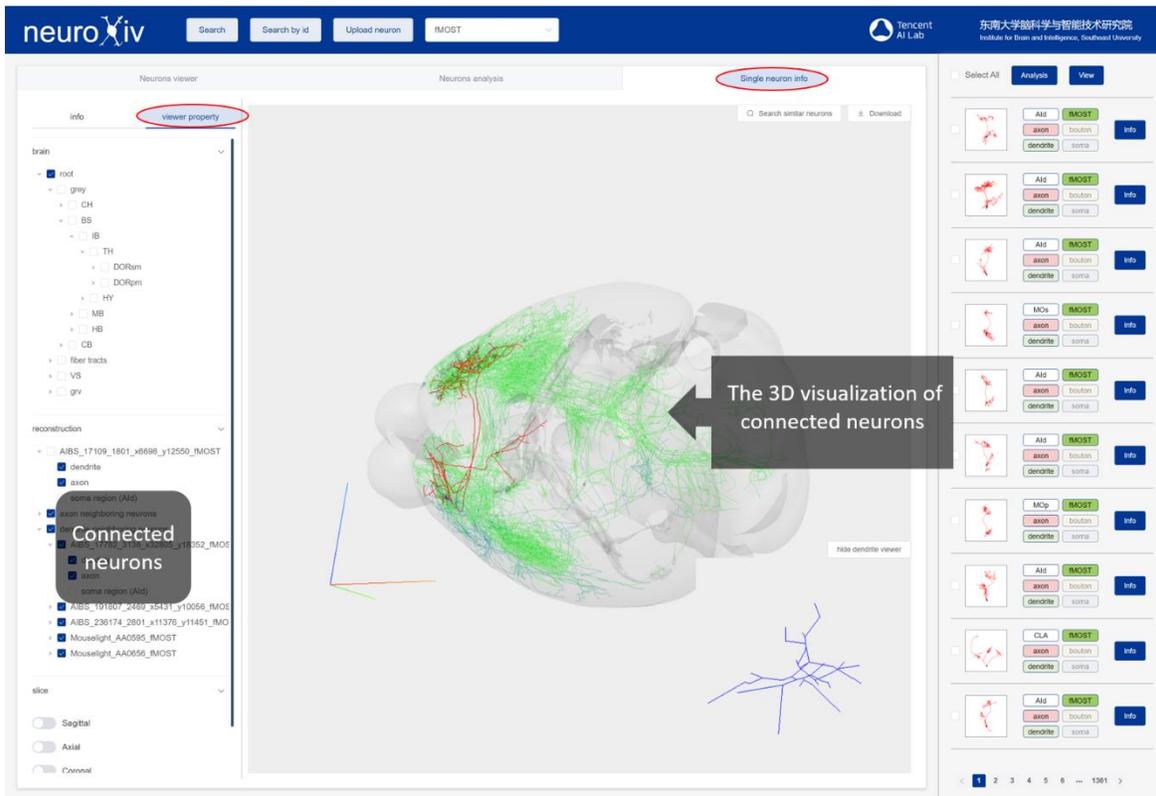
User also can rotate, scale, and pan the objects freely in the middle region (control object rotation with the left mouse key, use the right mouse key for object translation, and zoom with the mouse wheel).

In the lower right corner, user can rotate, scale, and pan the dendrite of neuron.

The screenshot displays the NeuroXiv web application interface. The top navigation bar includes the 'neuroXiv' logo, search options, and the 'Tencent AI Lab' logo. The main content area is divided into three sections: 'Neurons viewer', 'Neurons analysis', and 'Single neuron info'. The 'Neurons viewer' section on the left contains a tree view for 'brain' regions (root, grey, CH, BS, IB, MB, CB, fiber tracts, VS, grv) and a 'reconstruction' section for a specific neuron (AIBS_17109_1801_x0098_y12550_IMOST). The 'slice' section allows for selecting 'Sagittal', 'Axial', or 'Coronal' views. The central 3D viewer shows a brain model with a neuron reconstruction (red) and a brain slice (black). The 'Single neuron info' section on the right provides details for selected neurons, including their ID, reconstruction type (axon, bouton, dendrite, soma), and a 'Download' button. Annotations with arrows point to various features: 'viewer property' in the top left, 'Brain region' in the tree view, 'Neuron reconstruction (dendrite and axon)' pointing to the red neuron, 'Brain slice' pointing to the black slice, 'Brain region' pointing to the brain model, 'dendrite' pointing to a blue dendrite structure, and 'Download the neuron info' pointing to the 'Download' button in the 'Single neuron info' section.

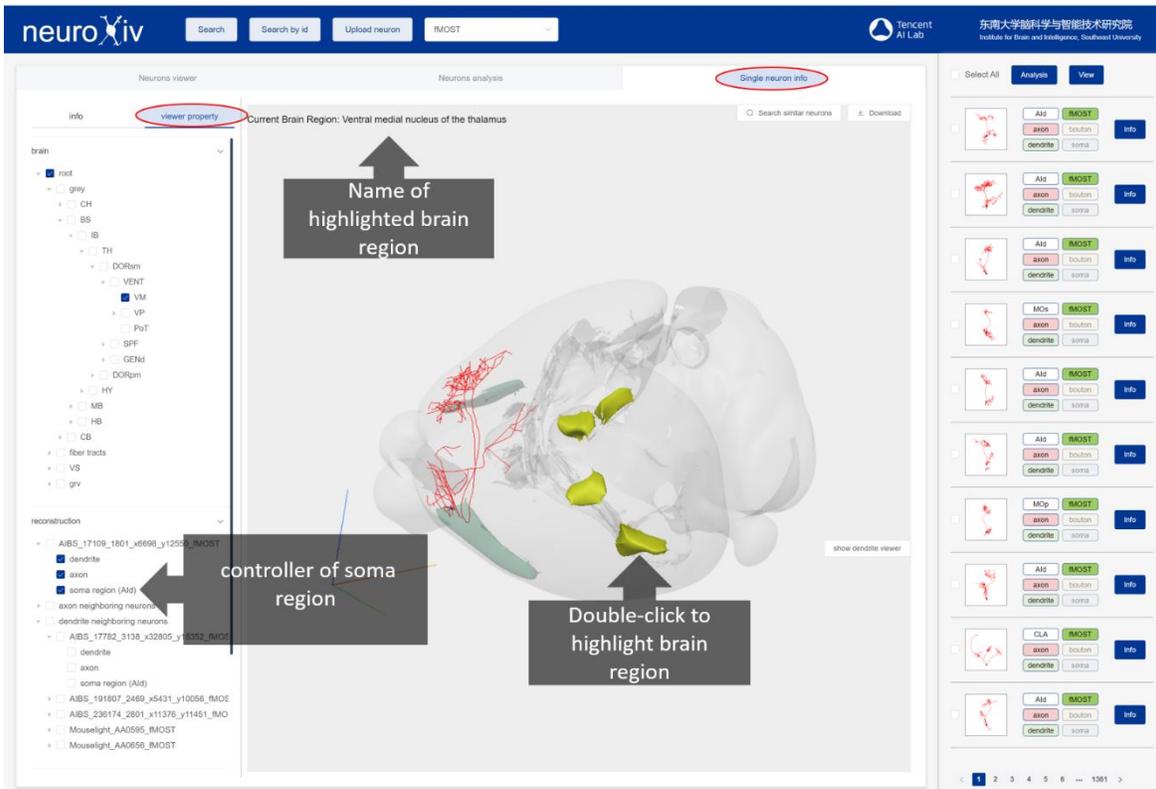
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User can observe the 3D visualization of the neurons connected to the viewed neuron.



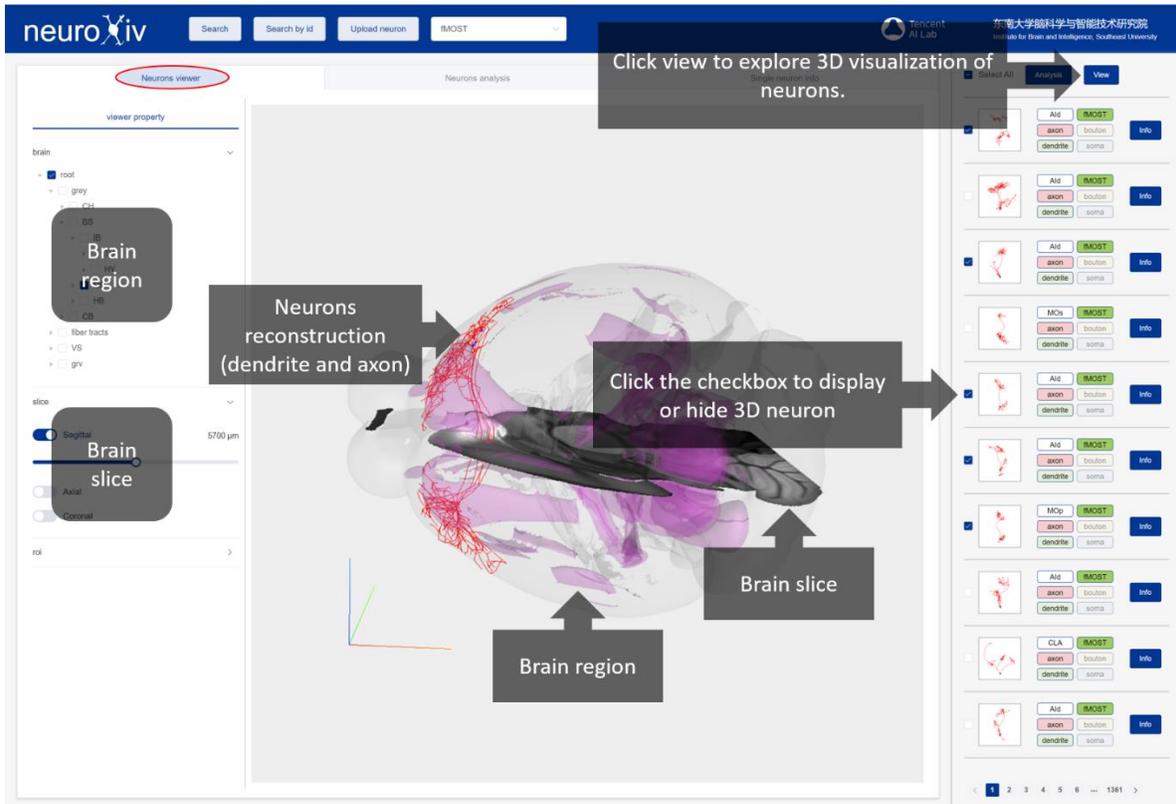
User can control the 3D visualization of soma region.

User can double-click the left mouse button to highlight a brain region.

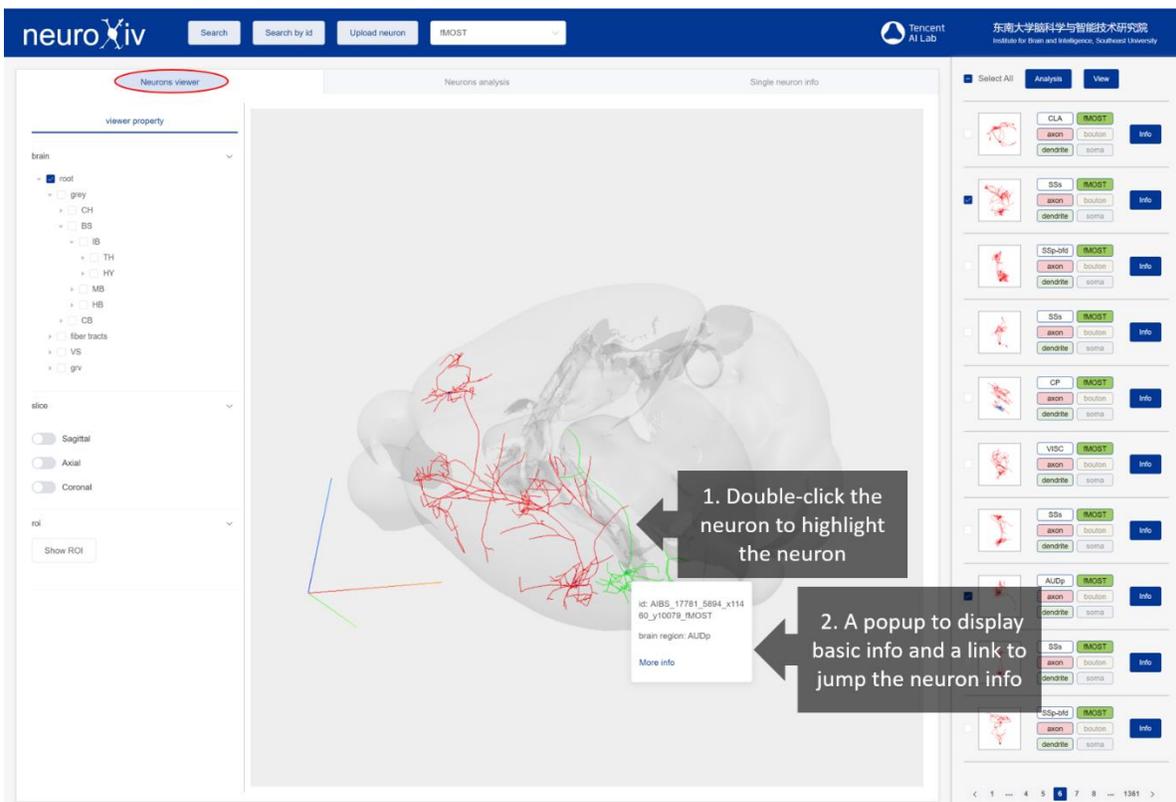


Select neurons of interest to explore 3D visualization

User can select neurons from the list to view the 3D visualization



User can select a single neuron from 3D viewer to see the info



Search neurons of interest

Click “search” button on the top to open search panel. User can search for neuron that meet the criteria they set.

The screenshot shows the NeuroXiv search interface with the following annotations:

- 1. Find the criteria in the tree menu**: Points to the 'Menu' on the left side of the search panel.
- 2. Click add button**: Points to the 'Add' button next to a criterion in the search criteria list.
- 3. Added criteria will appear here**: Points to the search criteria list where the selected criterion is now visible.
- 4. Edit values here**: Points to the input fields for numerical criteria, with a callout box labeled 'Search criteria added'.
- 5. Click confirm to search neurons of interest**: Points to the 'Confirm' button at the bottom right of the search panel.

Additional annotations include:

- Optional search criteria to be added**: Points to a criterion in the menu.
- Click delete to remove the criteria**: Points to the 'Delete' button for a criterion in the list.
- Reset the search criteria**: Points to the 'Reset' button at the bottom.

For categorical criteria like brain region, user needs to select from a given list of options.

The screenshot shows the 'Select brain region' modal with the following annotations:

- 1. Check the values to be added.**: Points to the 'Candidates' list in the modal.
- 2. Click arrow to remove/add options**: Points to the left and right arrow buttons in the modal.
- 3. Click confirm to finish**: Points to the 'Confirm' button at the bottom of the modal.

Additional annotations include:

- Option candidates**: Points to the 'Candidates' list.
- Selected options to be searched**: Points to the 'Selected' list in the modal.

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User can save and load their own search criteria.

The screenshot shows the 'Neuron Search' interface. On the right, there are buttons for 'Load Search Config' and 'Save Search Config'. A callout box with an arrow points to the 'Save Search Config' button, containing the text: "1. Click the button to save search config". In the center, a dialog box titled "Please input your search configure name:" is open, with the text "test_100" entered in the input field. A callout box with an arrow points to the 'OK' button in the dialog, containing the text: "2. Edit the name of search config and click ok".

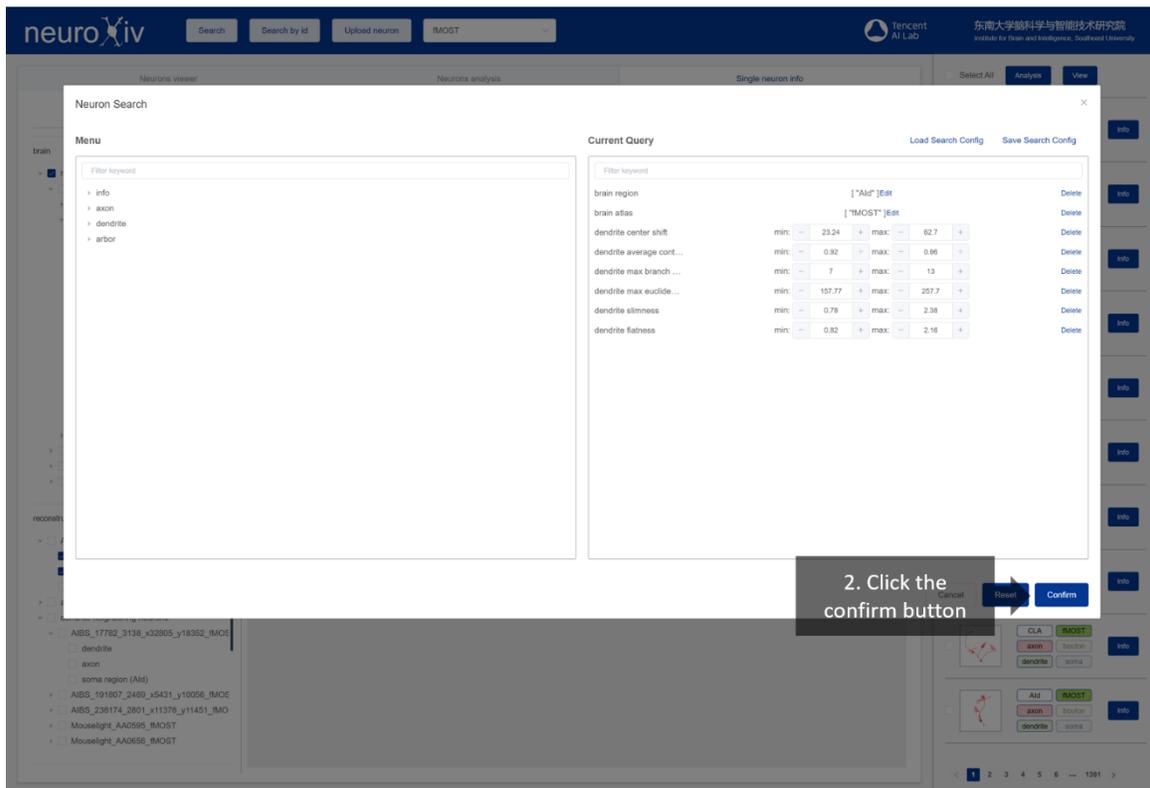
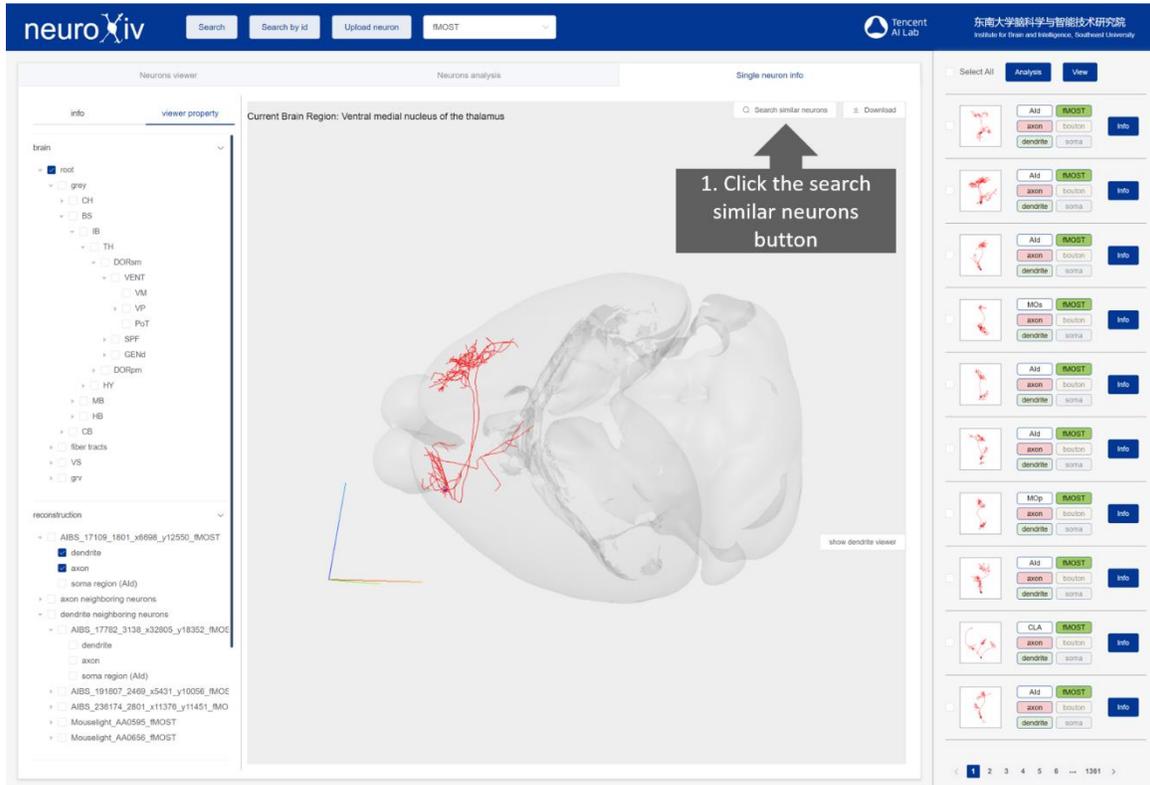
The screenshot shows the 'Load Search Config' dialog box. It contains a table with the following data:

Time	Search config name	Action
2022-04-29T11:15:42+08:00	test_100	Select Delete

Callout boxes provide instructions: "3. Click the button to load search config" points to the 'Load Search Config' button; "4. select the search config" points to the 'Select' button in the table; and "Delete the search config" points to the 'Delete' button in the table.

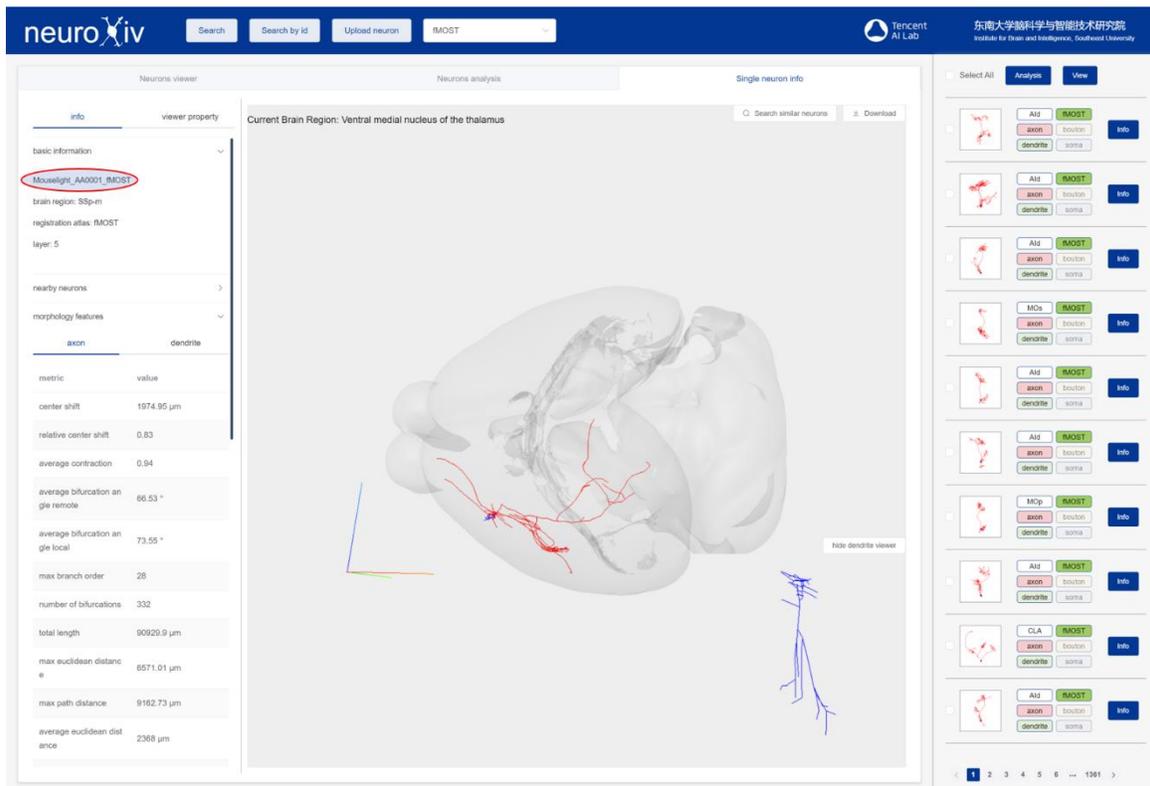
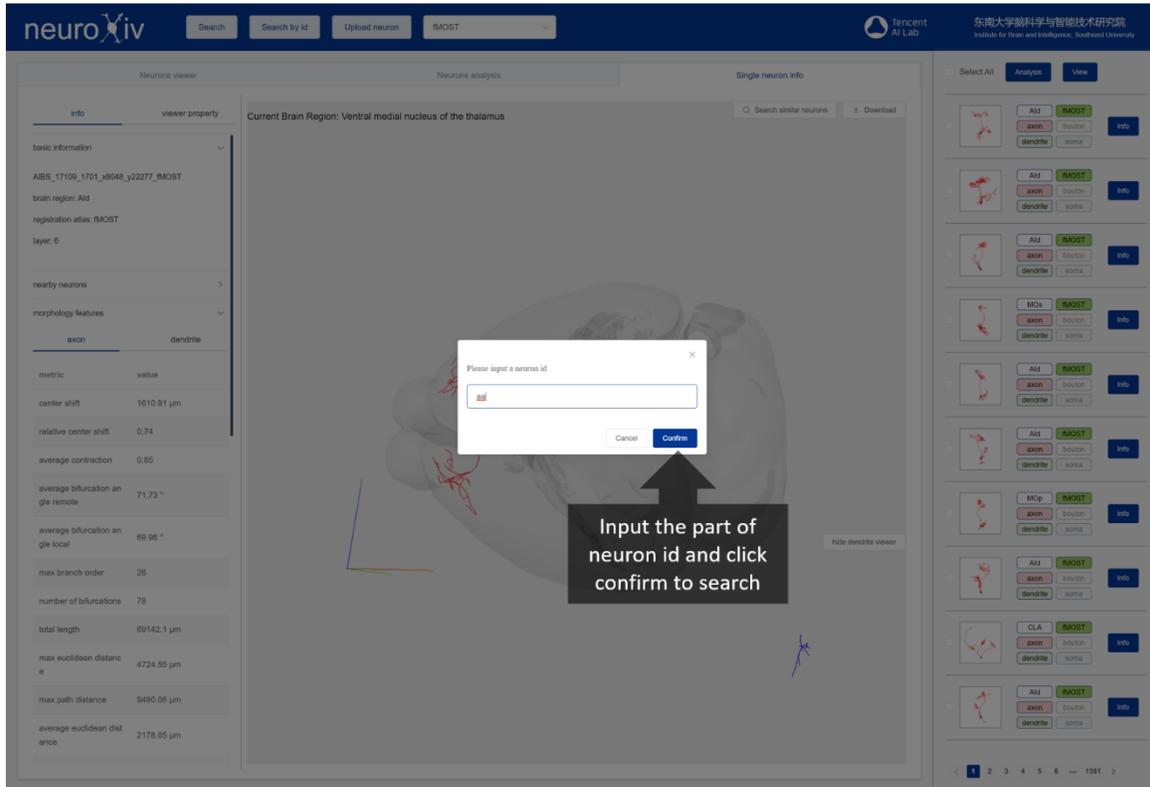
Search similar neurons

Click “search similar neurons” button in the single neuron info bar to open search panel. User can search similar neurons of the viewed neuron.



Search neuron by id

Click “search by id” button on the top to open search panel. User can search for a neuron based the neuron id and jump to single neuron info bar.



Search neurons based ROI

Click "Show ROI" button of "roi" in the Neurons Viewer bar or Single neuron info bar. User can search neurons based ROI.

The screenshot displays the neuroXiv web application interface. At the top, there is a navigation bar with the 'neuroXiv' logo, search options, and institutional affiliations (Tencent AI Lab and Southeast University). The main content area is divided into three panels: 'Neurons viewer', 'Neurons analysis', and 'Single neuron info'. In the 'Neurons viewer' panel, the 'viewer property' sidebar is open, showing various categories like 'brain', 'reconstruction', 'slice', and 'roi'. The 'roi' category is selected, and a 'Show ROI' button is visible. A dark grey callout box with a white arrow points to this button, containing the text '1. Click Show ROI'. The central 3D viewer shows a brain model with red neuron reconstructions. On the right, the 'Single neuron info' panel lists several neurons with their respective properties (Aid, axon, dendrite, bouton, soma) and an 'Info' button for each. A pagination bar at the bottom right shows the current page is 1 out of 1361.

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neuroxiv Search Search by id Upload neuron IMOST Tencent AI Lab 东南大学脑科学与智能技术研究院 Institute for Brain and Intelligence, Southeast University

Neurons viewer Neurons analysis Single neuron info

viewer property

Hide ROI

r (μm) 500
x (μm) 6685
y (μm) 3741
z (μm) 5000

Update Search Neurons Inside

double left-click in 3D view to hide ROI

Click this to hide ROI

A ball representing the ROI

2. Double-click the left-key of mouse on the ROI

Click "Update" to set position and radius of ROI

Select All Analysis View

Aid IMOST
axon bouton
dendrite soma info

MOp IMOST
axon bouton
dendrite soma info

Aid IMOST
axon bouton
dendrite soma info

CLA IMOST
axon bouton
dendrite soma info

Aid IMOST
axon bouton
dendrite soma info

1 2 3 4 5 6 ... 1361 >

neuroxiv Search Search by id Upload neuron IMOST Tencent AI Lab 东南大学脑科学与智能技术研究院 Institute for Brain and Intelligence, Southeast University

Neurons viewer Neurons analysis Single neuron info

info viewer property

brain
reconstruction
slice
roi

Hide ROI

r (μm) 500
x (μm) 4088
y (μm) 3871
z (μm) 2905

Update Search Neurons Inside

double left-click in 3D view to hide ROI

The position of the ROI

3. Set and update the radius of ROI

4. Click "Search Neurons Inside" to search data

The result will show in here

The ball will move to the ROI

Select All Analysis View

Aid IMOST
axon bouton
dendrite soma info

Aid IMOST
axon bouton
dendrite soma info

Aid IMOST
axon bouton
dendrite soma info

MOp IMOST
axon bouton
dendrite soma info

Aid IMOST
axon bouton
dendrite soma info

CP IMOST
axon bouton
dendrite soma info

Aid IMOST
axon bouton
dendrite soma info

CP IMOST
axon bouton
dendrite soma info

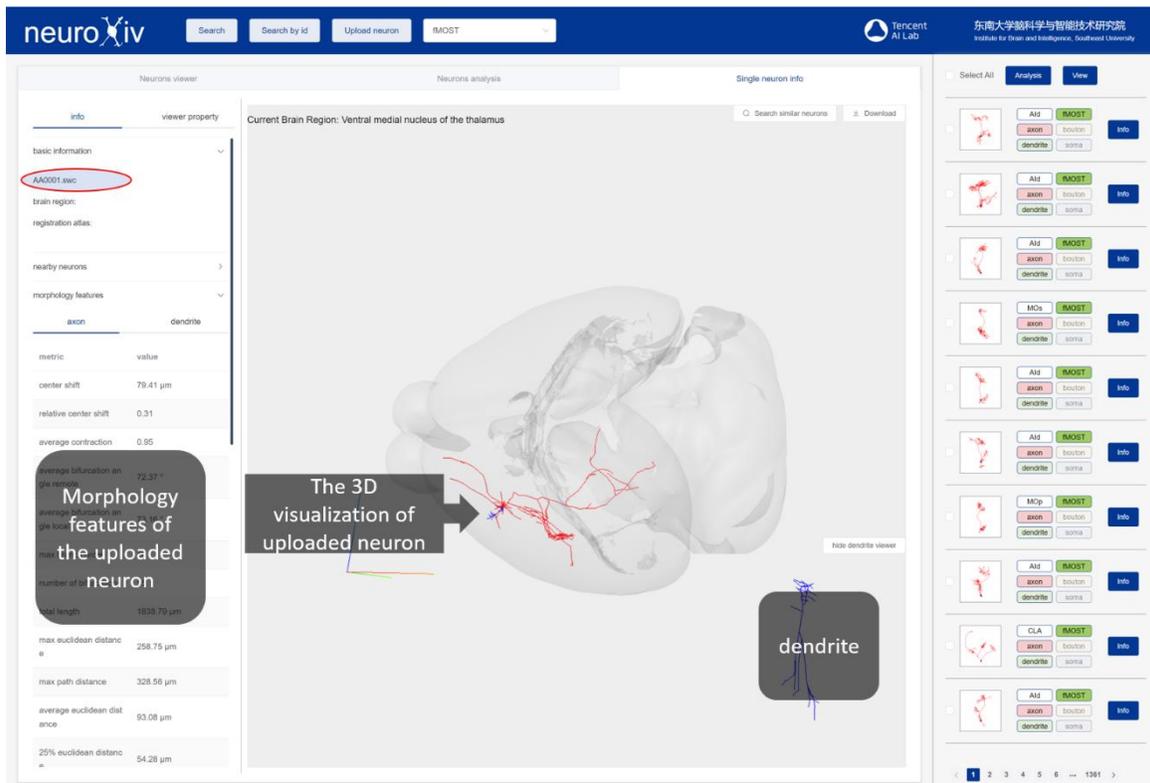
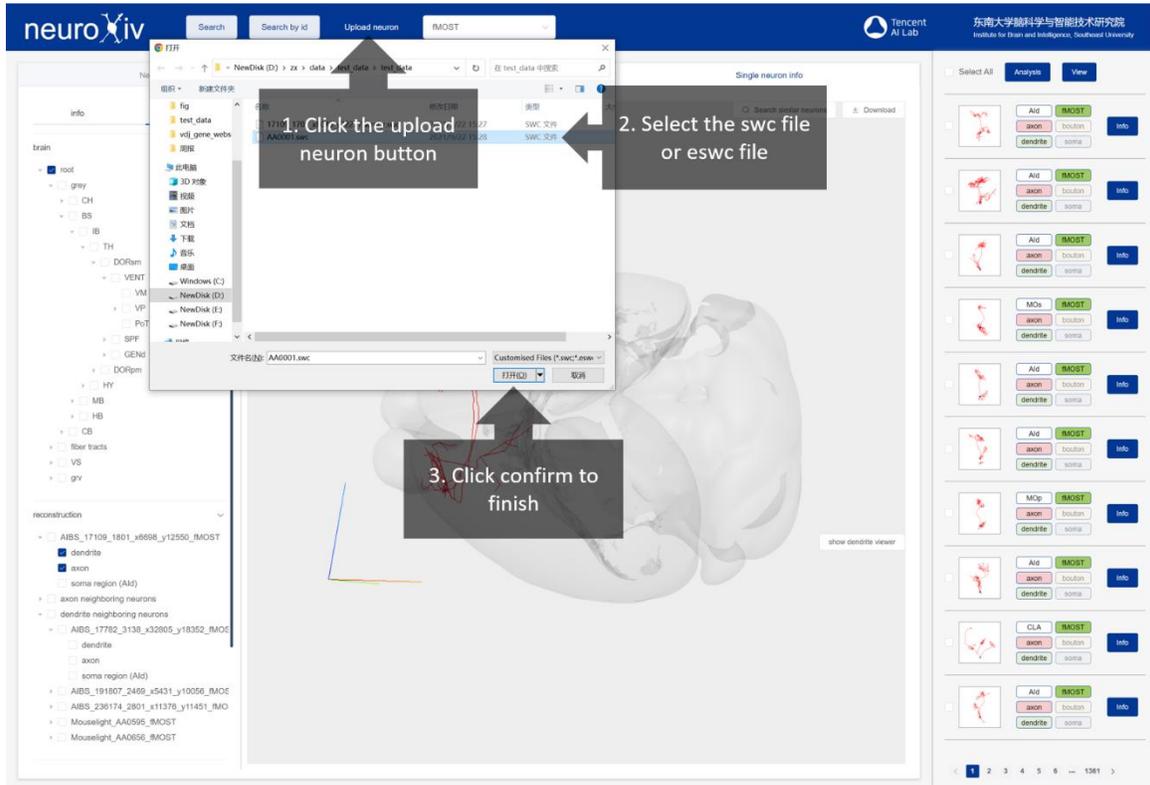
Aid IMOST
axon bouton
dendrite soma info

CP IMOST
axon bouton
dendrite soma info

1 2 3 4 5 6 7 >

Upload neuron

Click “upload” button on the top to open search panel. User can calculate the morphology features and explore the 3D visualization of uploaded neuron.



Explore the cross species atlas

Click brain region of neuron in neuron list to jump cross species atlas web page.

Click the number of neuron collections to jump neuron web page.

Click the middle part of the brain region or the left brain region tree structure to display the information of the brain region.

The screenshot displays the NeuroXiv web interface. At the top, the logo "neuroxiv" is on the left, and the Tencent AI Lab logo and "东南大学脑科学与智能技术研究院" (Institute for Brain and Intelligence, Southeast University) are on the right. The interface is divided into several sections:

- Left Panel (Menu):** A tree structure for brain regions. The "Aid" region is selected and highlighted in blue. Other regions listed include root, grey, CH, CTX, CTXpl, Isocortex, FRP, MO, SS, GU, VISC, AUD, VIS, ACA, PL, ILA, DRB, AI, Alp, Alv, RSP, PTLp, TEa, PERI, ECT, OLF, HPF, CTXsp, CNU, BS, CB, fiber tracts, VS, grv, and retina.
- Top Center (Filters):** "Species" is set to "Adult Mouse" and "Template" is set to "template".
- Top Right (Metadata):**
 - species: Adult Mouse
 - atlas: CCFv3
 - brain region: Agranular insular area, dorsal part(Aid)
 - neuron collections: 412
 - adjacent brain regions:
 - related brain regions:
- Center (Main View):** A 3D rendering of a mouse brain in coronal section, with the "Aid" region highlighted in blue.
- Right Panel (Thumbnail Gallery):** A vertical stack of 10 brain slice thumbnails. The 4th thumbnail from the top is highlighted with a blue border, indicating the current slice.
- Bottom Right (Navigation):** A set of navigation controls including arrows and a page number "4" out of "17".

NEUROXIV USER INSTRUCTION

The screenshot displays the neuroXiv web application interface. At the top left is the 'neuroXiv' logo. At the top right are the logos for 'Tencent AI Lab' and '东南大学脑科学与智能技术研究院' (South China University of Science and Technology Institute of Brain and Intelligence). The main interface is divided into several sections:

- Left Panel (Menu):** Contains a 'Species' dropdown set to 'Adult Mouse' and a 'Template' dropdown set to 'template'. Below is a 'Filter keyword' input field and a hierarchical tree view of brain regions. The 'MEA' region is highlighted in blue.
- Center Panel:** Shows a 3D brain model with two regions highlighted in blue. A grey callout box with the text '1. Click brain region to popup info' points to one of these regions.
- Right Panel (Info):** Displays two columns of information for the selected brain region. The left column lists 'species: Adult Mouse', 'atlas: CCFv3', 'brain region: Medial amygdalar nucleus(MEA)', 'neuron collections: 52', 'adjacent brain regions: Central amygdalar nucleus(CEA), Basomedial amygdalar nucleus(BMA), Lateral hypothalamic area(LHA), Lateral preoptic area(LPO), Basolateral amygdalar nucleus(BLA)', 'related brain regions: Tree Shrew: Medial amygdaloid nucleus(MeA)'. The right column lists 'species: Adult Mouse', 'atlas: CCFv3', 'brain region: Basomedial amygdalar nucleus(BMA)', 'neuron collections: 78', 'adjacent brain regions: Central amygdalar nucleus(CEA), Medial amygdalar nucleus(MEA), Basolateral amygdalar nucleus(BLA)', 'related brain regions: Tree Shrew: Basomedial amygdaloid nucleus(BMA)'. A grey callout box with the text 'Mouseover blue text to popup other info' points to the 'Basomedial amygdalar nucleus(BMA)' text in the right column.
- Far Right Panel:** A vertical stack of eight coronal brain slices, with the top slice highlighted in blue. At the bottom of this panel is a navigation bar with page numbers 1 through 11.