Short overview

Key features

Behavior Atlas

3D-AI Animal Behavior Analysis System

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The Power of BehaviorAtlas

The 3D-AI Animal Behavior Analysis System sets a new standard in behavioral research, offering exceptional precision and efficiency. It precisely identifies over 16 anatomical points and captures complete 3D skeletal trajectories – all without physical markers or invasive procedures.

Engineered for versatility, it operates seamlessly across multiple species, enabling fully automated, intelligent, and ultra-precise behavioral assessment that accelerates discovery and ensures reproducible results.

Features

3D Skeleton Construction

3D skeleton reconstruction based on 4 different video recordings. Effectively addresses the issue of animal body occlusion and avoids blind areas.

Behavior Clustering

Unsupervised clustering with accurate extraction of over 40 types of behavioral subtypes, including walking, running, standing, sniffing, scratching, jumping, etc.

Kinematic Parameter Extraction

Based on 3D skeleton and behavioral sequences, calculates animal speed, motion intensity, body parameters, position parameters, etc.

Visualization Analysis

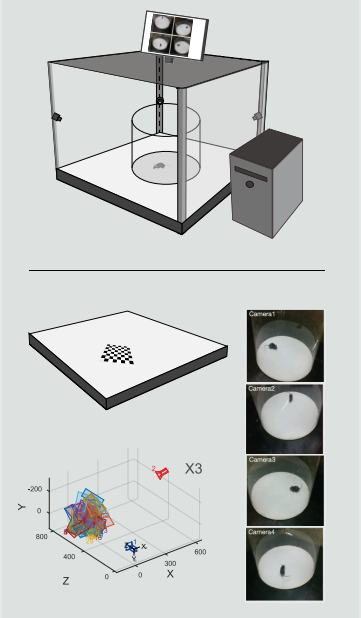
Comparative analysis of multiple sample groups, classification of behavioral characteristics, generation of ethograms, etc.

3D-AI Behavioral Analysis Workflow

From capture to insight, the 3D–AI Behavioral Analysis Workflow delivers precise, rich behavioral data with minimal setup. It enables recording, analyzing, and exploring behavior without any human bias. Fast, accurate and easy.

1. Capture

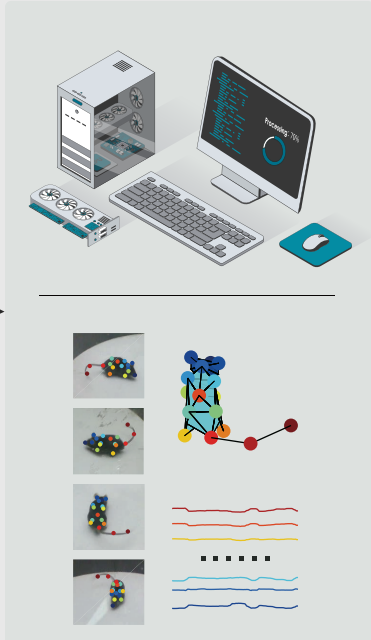
3D Behavioral Capture Device



Raw Videos

2. Analyse

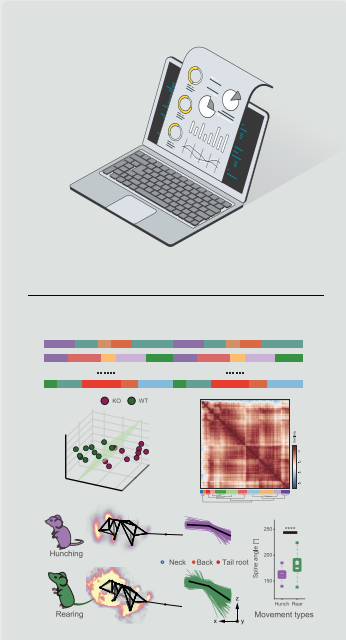
High-Performance Behavior Capture Analysis Workstation



Behavior Data

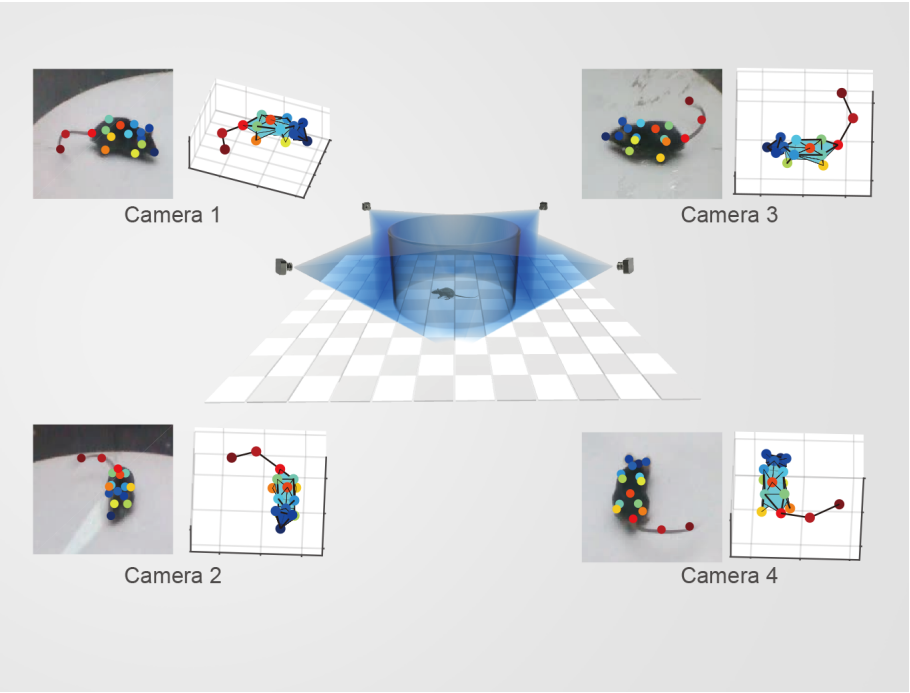
3. Explore

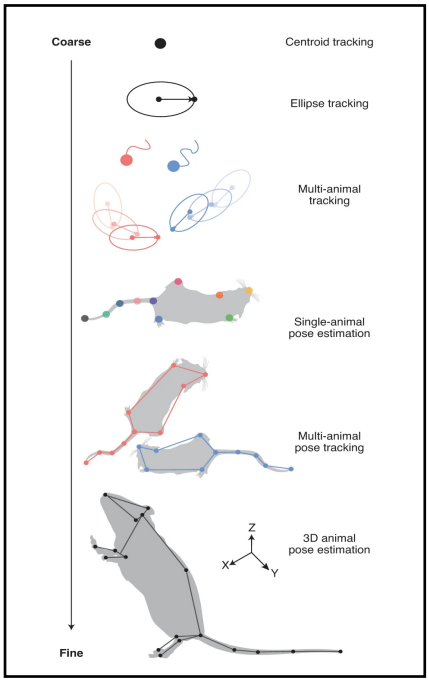
Interactive and Visual Data Analysis



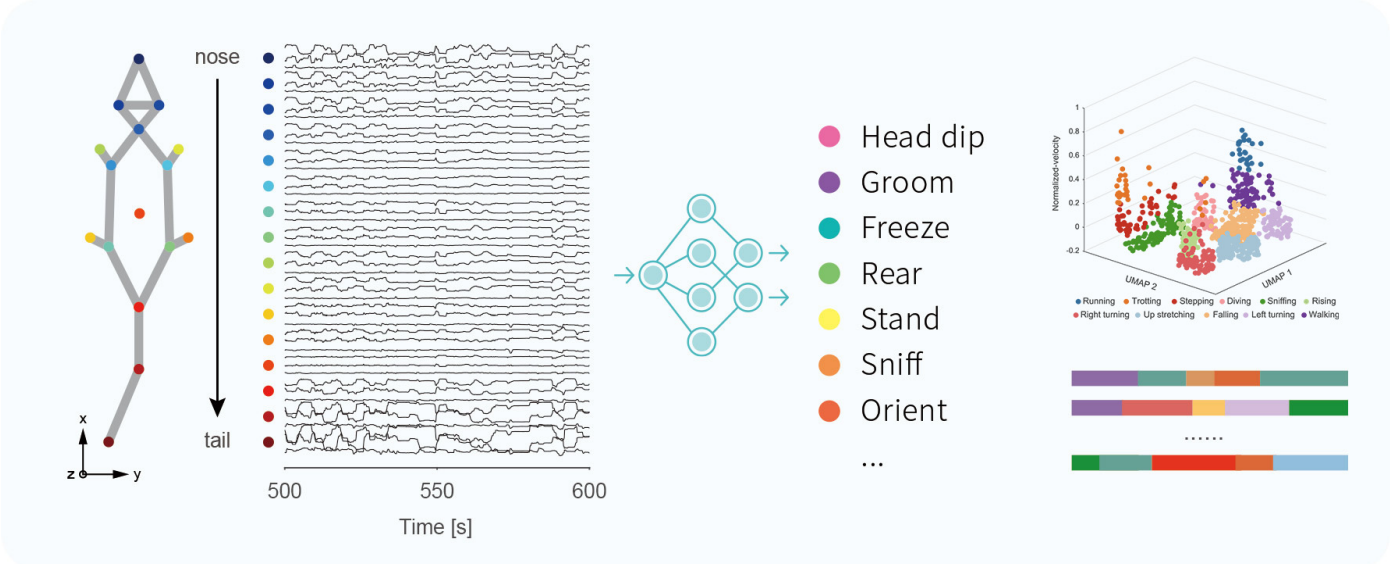
Feature Extraction of Animal Behavior Based on Deep Learning: From Basic to Fine

BehaviorAtlas extracts animal behaviors from multiple views.



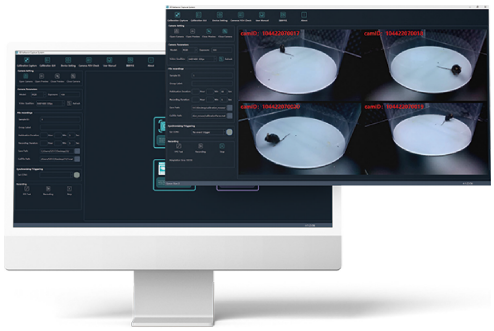


Quantifying high-dimensional, continuous, and dynamic behavior big data into behavior parameters.



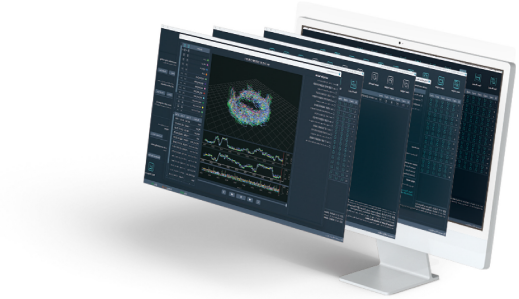
Software Introduction

Behavior Capture Software



- Multiple cameras allow for flexible adjustment of angles and rapid calibration.
- Sensitive monitoring of vertical and horizontal movements such as climbing.
- Multi-view video capturing effectively addresses the issue of animal body occlusion and avoids blind areas.

Data Processing Software



- Multi-view animal 3D skeleton reconstruction.
- Single-view AI recognition of multiple body parts of animals.
- Construction of ethograms and decomposition of behavior sequences.
- Extraction of behavior parameters based on 3D skeleto and behavior sequences.

Behavior Visualization Software

- Interactive and visual preview of behavior data.
- Synchronized preview of kinematics and behavioral images
  such as real-time videos, 3D skeletons, trajectory, etc.
- Comparative analysis of multiple sample groups through grouping function.
- Support for easy annotation of unsupervised cluster, video sequencing, various parameter calculations, and image drawing.

Applications

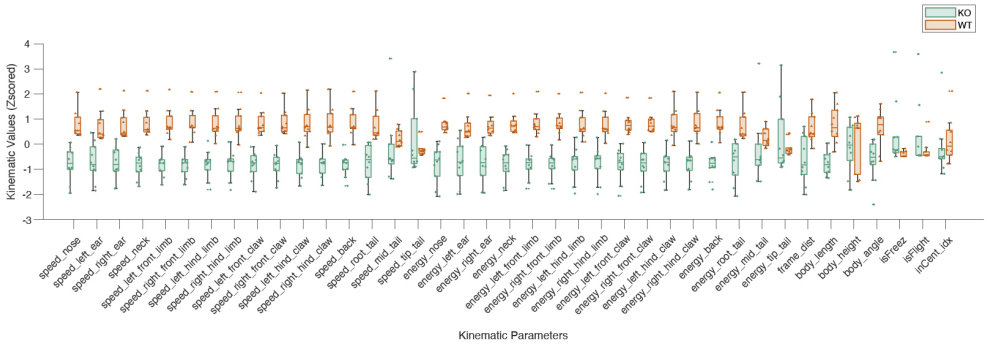
With over 80 research partners worldwide, BehaviorAtlas neurobehavioral solution is advancing a wide range of studies. The 3D-AI Behavioral Analysis System is applied for rodents to support research in Autism, Postoperative Delirium, Depression-like and anxiety-like behaviors, Duchenne muscular dystrophy. These applications drive measurable breakthroughs and accelerate discovery for our customers.

Autism

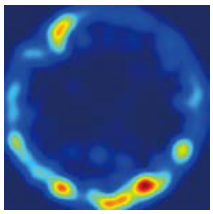
Anxiety

Depression

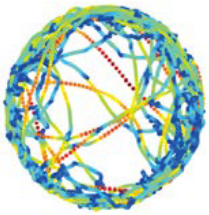
Kinematic Parameter Analysis



Inter-group kinematic parameter statistics

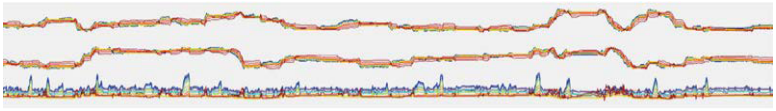


Position heatmap

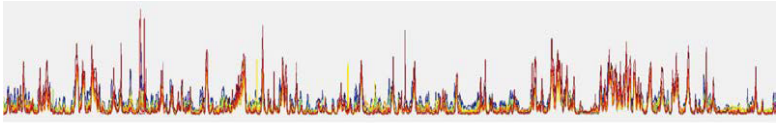


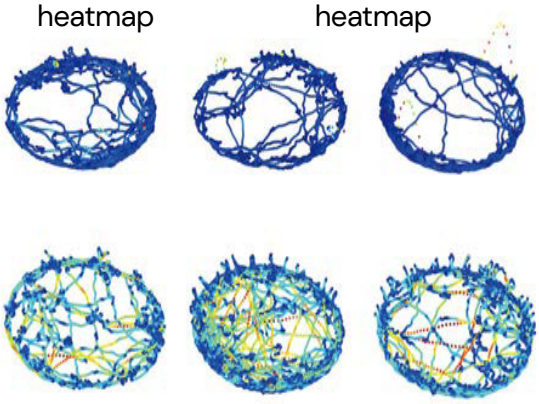
Position heatmap

Trajectory

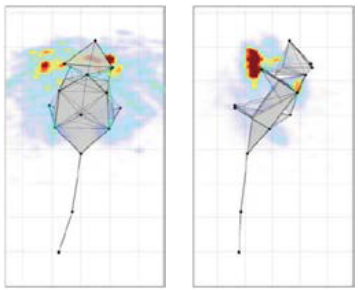


Speed



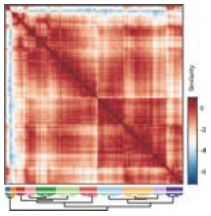


Single-sample speed-trajectory heatmap (3D)

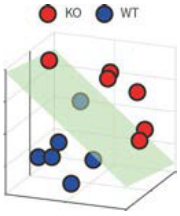


Single-sample body average overlay heatmap (left: top view; right: side view)

Behavior Parameter Analysis



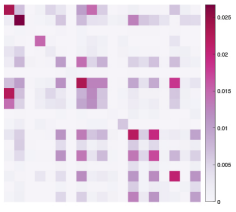
Pairwise similarity matrix



Inter-group movement distribution

Action state transition analysis

Ethogram



Action transition frequency matrix heatmap

Selected Publications

- Liu, X., Lai, J., Han, C., Zhong, H., Huang, K., Liu, Y., Zhu, X., Wei, P., Tan, L., Xu, F., & Wang, L. (2025). Neural circuit underlying individual differences in visual escape habituation. Neuron, 113(14), 2344-2357.e5. https://doi.org/10.1016/j.neuron.2025.04.018

- Ye, J., Xu, Y., Huang, K., Wang, X., Wang, L., & Wang, F. (2025). Hierarchical behavioral analysis framework as a platform for standardized quantitative identification of behaviors. Cell Reports, 44(2). https://doi.org/10.1016/j.celrep.2025.115239

- Liu, J., Ye, J., Ji, C., Ren, W., He, Y., Xu, F., & Wang, F. (2024). Mapping the Behavioral Signatures of Shank3b Mice in Both Sexes. Neuroscience Bulletin, 40(9), 1299–1314. https://doi.org/10.1007/s12264-024-01237-8

- Wang, F., Sun, H., Chen, M., Feng, B., Lu, Y., Lyu, M., Cui, D., Zhai, Y., Zhang, Y., Zhu, Y., Wang, C., Wu, H., Ma, X., Zhu, F., Wang, Q., & Li, Y. (2024). The thalamic reticular nucleus orchestrates social memory. Neuron, 112(14), 2368-2385.e11. https://doi.org/10.1016/j.neuron.2024.04.013

- Huang, K., Han, Y., Chen, K., Pan, H., Zhao, G., Yi, W., Li, X., Liu, S., Wei, P., & Wang, L. (2021). A hierarchical 3D-motion learning framework for animal spontaneous behavior mapping. Nature Communications, 12(1), 2784. https://doi.org/10.1038/s41467-021-22970-y

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