

SenseLab: Neuroinformatics tools to support multiscale and multidisciplinary integration

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Data integration is a major challenge for neuroscience. The goal of SenseLab, launched in 1993 among the first programs in the Human Brain Project, is to provide tools to accomplish this across multiple scales and multiple data types, using the olfactory system as a model. It consists of 8 closely integrated databases and database tools.

ORDB (Olfactory Receptor Database) was formed to support research on the largest family in the genome; it now contains over 14,000 genes and proteins. OdorDB is an archive of over 200 odor molecules that are known to interact with ORs. OdorMapDB archives 2-deoxyglucose and high field fMRI spatial activity patterns elicited by the odor molecules in the glomerular layer of the olfactory bulb of mice and rats. SenseLab also contains databases supporting functional studies of neurons and neural circuits. CellPropDB is an archive for synaptic receptors, ion channels, and neurotransmitters expressed by a given neuron type in 18 brain regions. NeuronDB archives these properties in relation to different dendritic and axonal compartments. Both include tools for identifying classes of properties across different neuron types. ModelDB now contains over 700 computational models for neurons and neuronal circuits, with tools for searching for different model types, and ability to the run the models as published or modify them by the user. MicrocircuitDB contains the models devoted specifically to circuits within different brain regions. Finally, BrainPharm is a new initiative to support research on drugs to treat neurological disorders. Rapid navigation of the databases will be demonstrated, and current research in neuroinformatics, dendritic function, and large-scale neural circuits, will be described.

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