How well do models cover the diversity of experimentally recorded neurons? Which features are maximally differentiable among neuron/model types and their dynamical behaviors? Are there models of neurons and channels that are outliers when compared to each other and to cortical neuron electrophysiology data?

**Motivation**
NeuroML-DB [2] catalogues over 1,500 published models obtained in NeuroML format from Open Source Brain [5]. Complementing OSB, NeuroML-DB provides systematic characterizations of model complexity, electrophysiology, and morphology, making it easy to find, evaluate, and reuse models and their components.

**Comparing to Data**

**Channel Mechanisms**
We investigate different channel types responsible for neuron model behaviors. Top: Projected clusters of cortical neuron models in feature space. Bottom: Normalized maximal conductance for slow inactivating K+ channel in soma for same models.

**Comparing to Data**
Hierarchical clustering of models with a density-based clustering method (HDBSCAN) on PCA-reduced features. Factor loading reveals features associated with top three components as shown directly above. Clusters correspond well to assigned electrical types, but outliers exist at different levels and will be the subject of further investigation.

**Channel Mechanisms**
Agglomerative clustering of model channel dynamics for multiple simulation protocols reveals channels that do not behave like other channels of that type.

**DIY Model Analysis!**
NeuroML-DB data are available via an API, which returns a JSON object in response to a URL. See documentation at https://neuroml-db.org/api and links to browse add-ons and examples for working with JSON URLs in programming languages like Python, R, and MATLAB.

**References**

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