

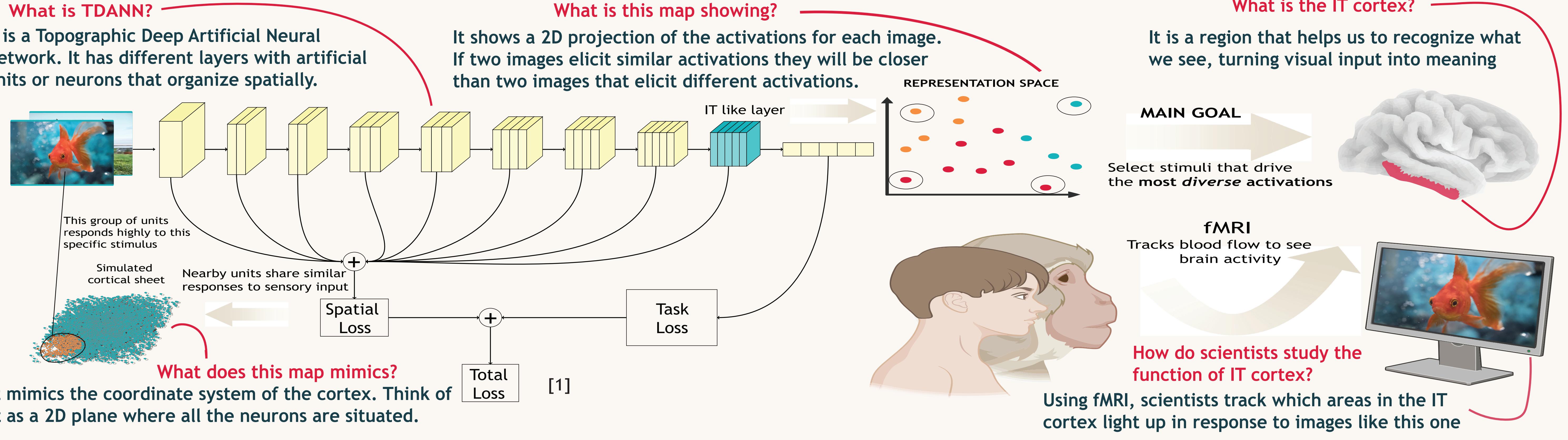
Make each visual stimulus count

Optimizing Stimulus Selection to enhance Understanding of the Inferior Temporal Cortex Organization using biologically constrained TDANN

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Contextualization: This work was carried out as a Supervised Project of the Master in Computational Neuroscience and Neuroengineering.

INTRODUCTION



Model validity

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Are the activations of TDANN model units similar to the activations of monkey neurons?

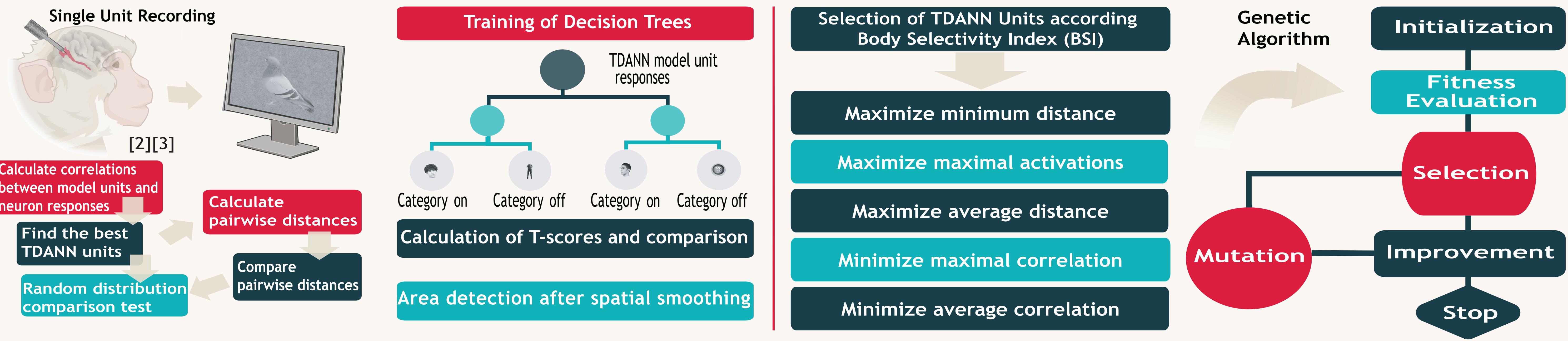
Are the TDANN model units capable of displaying category selectivity areas in its artificial cortical map?



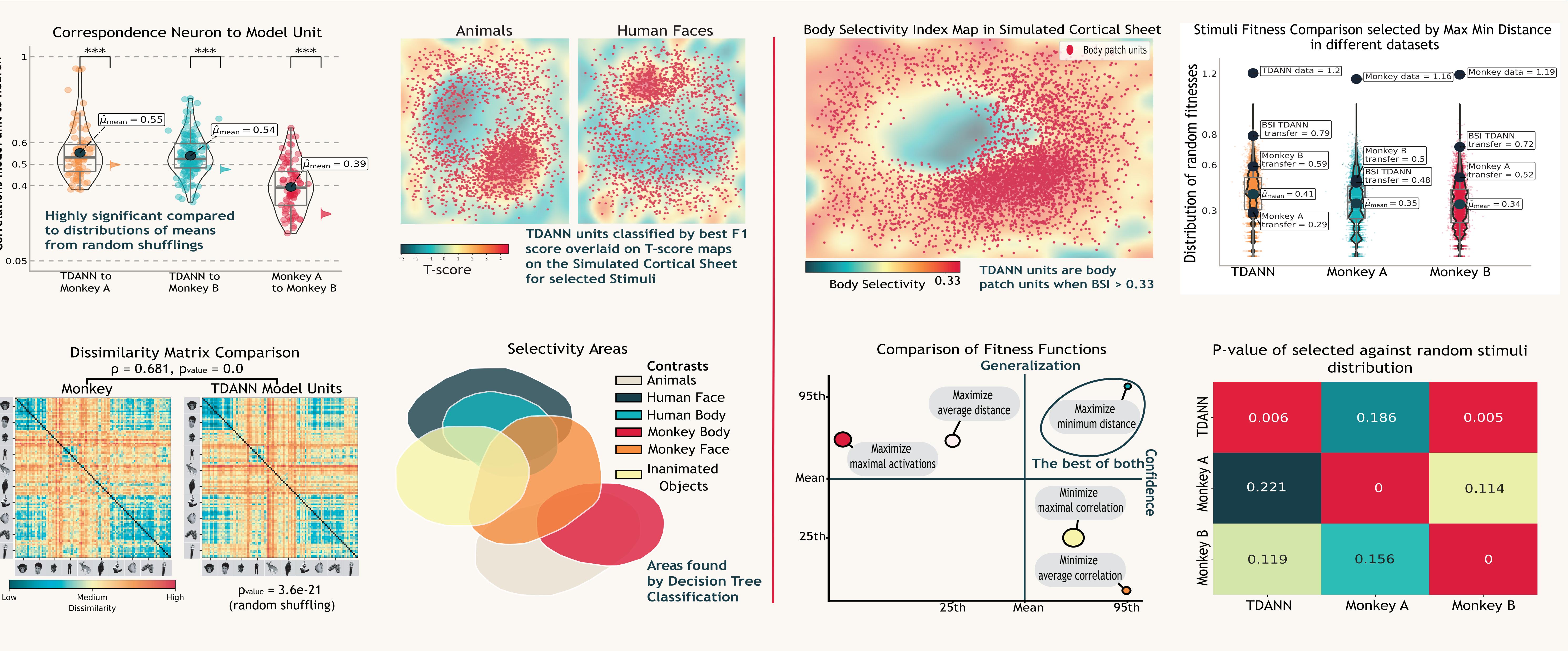
Which measures can assess the potential to drive diverse activations within a set of stimuli?

How do we select the stimuli?

METHODS



RESULTS



Discussion

- Selected TDANN units show similar activations to monkey neurons for the same stimuli. TDANN units are able to represent category-selective areas like high-level visual regions.
- Decision trees identify units most effective for predicting categories, which align with T-score based units, indicating selectivity over simple discrimination.
- TDANN exhibits similar category-selective areas as those seen in the brain. However, human and monkey body and face stimuli activate distinct, non-overlapping TDANN body and face areas, respectively. This finding contrasts with previous observations in the monkey inferior temporal (IT) cortex, indicating a need for further refinement of the TDANN model.
- "Maximize minimum distance" is the most reliable measure for diversity, offering better generalization and the lowest standard deviation.
- TDANN successfully supports our developed genetic algorithm selecting diverse stimuli that lead to varied activation patterns in monkeys. TDANN may generalize better than monkey neurons, but this requires further validation.

References

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- [3] Popivanov, I. D., Jastorff, J., Vanduffel, W., & Vogels, R. (2012). Stimulus representations in body-selective regions of the macaque cortex assessed with event-related fMRI. *Neuroimage*

Link

