Neural Taskonomy: Inferring the Similarity of Task-Derived Representations from Brain Activity

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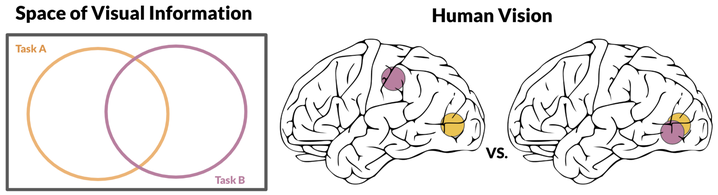
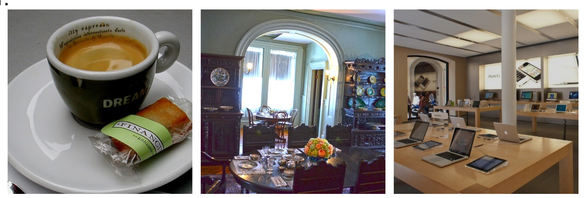
Introduction

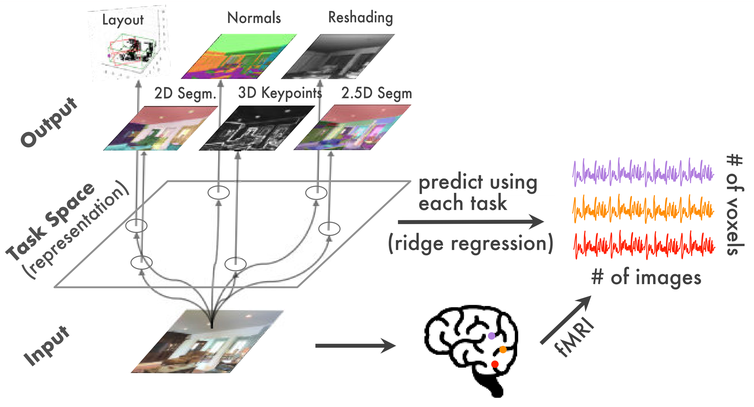
- "Taskonomy" describes the task relationships found through transfer learning using computer vision models[1].
- The Goal: Does the brain represent task information the similar way as found through transfer learning?



- BOLD5000[2] – fMRI dataset using stimuli sampled from ImageNet, COCO and SUN.



Methods



Acknowledgement and References

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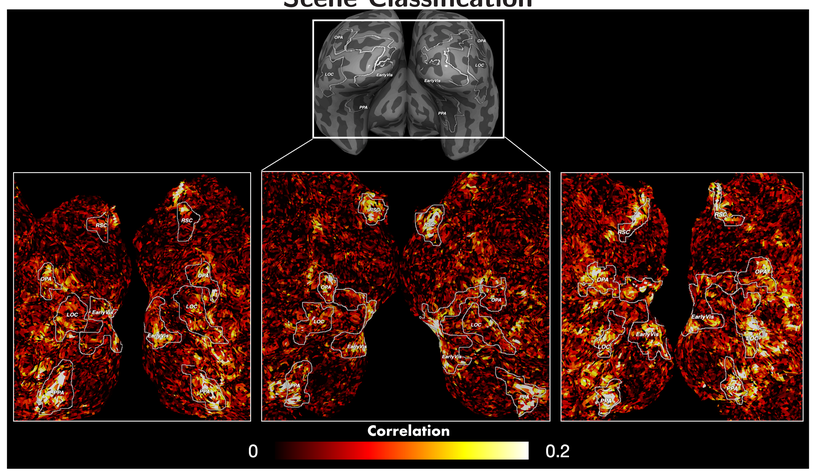
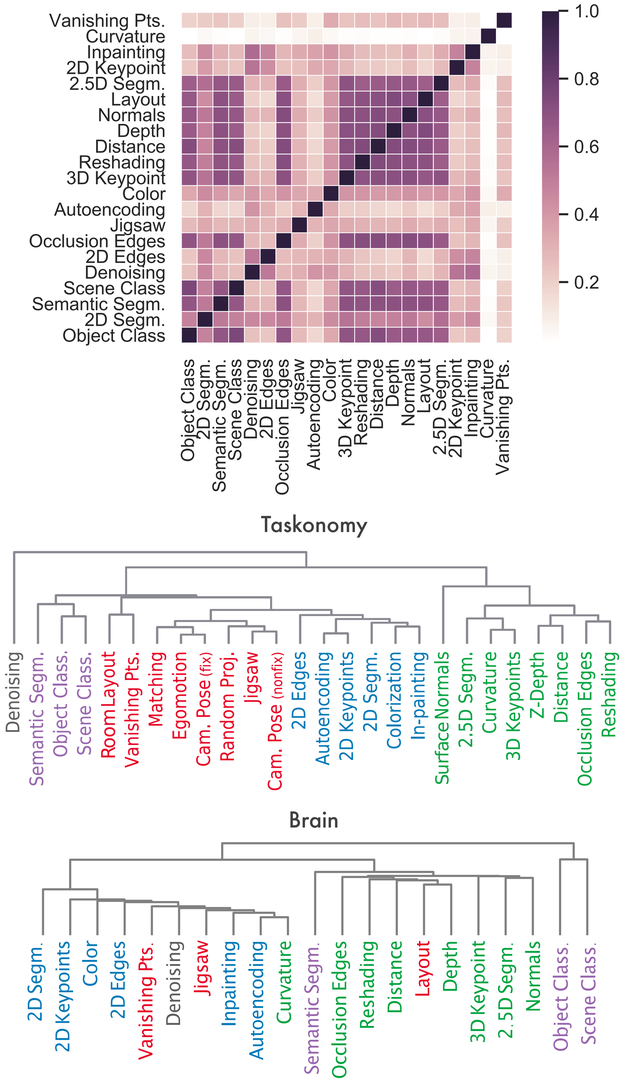
[1] A. R. Zamir et al. "Taskonomy: Disentangling task transfer learning". In: *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition*. 2018, pp. 3712–3722.

[2] N. Chang et al. "BOLD5000, a public fMRI dataset while viewing 5000 visual images". In: *Scientific data* 6.1 (2019), p. 49.

Model Performance - Whole Brain



Neural Taskonomy



Conclusions

- Task-specific models are useful for explicating the neural encoding of task-related information.
- Features from 2D tasks and 3D tasks recruit distinct regions of visual cortex (3D features preferred).
- The neural representation of different tasks can be used to infer the relationships between tasks.