

Visual Pathways from the Perspective of Multi-Task Dnns

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Presentation Abstract Summary Here we explore to what degree we can understand the pathways in the visual system from the perspective of Deep Neural Networks (DNN's) that have been trained on multiple tasks. Tasks become easier to solve when they are decomposed into subtasks with their own cost function and we believe that "vision for perception" and "vision for action" pathways, as observed in the visual system, are examples of this. We hypothesize that if the visual system optimizes multiple cost functions of unrelated tasks this causes the emergence of different pathways and we predict that the degree to which tasks are related is a good descriptor of the degree to which they can share downstream-cortical-units. To test this hypothesis we test the degree of unit sharing with two networks that have either been trained on two related or unrelated tasks, using an identical stimulus set. Results of the simulations confirm our results. We conjecture that this approach could be used to relate multi-task DNN's to the anatomical and functional organization of the visual system.

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