Results: [20, 35] Crossings

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The CNN (88M params) and ViT (86M params) were fine-tuned on a new dataset $\mathcal{D}$ comprising unknot $\mathcal{U}$ and non-trivial knot $\mathcal{K}$ diagrams partitioned into three disjoint data splits $S := \{\text{train, test, val}\}$, where:

$$\mathcal{D} = \biguplus_{s \in S} \mathcal{D}_s$$

$$|\mathcal{D}| = 560{,}000 \text{ diagrams},$$

$$|\mathcal{D}_{\text{train}}| = 0.8 \cdot |\mathcal{D}| = 448{,}000 \text{ diagrams},$$

$$|\mathcal{D}_{\text{val}}| = |\mathcal{D}_{\text{test}}| = 0.1 \cdot |\mathcal{D}| = 56{,}000 \text{ diagrams},$$

$$\text{where } \forall s \in S,\ s \in \mathcal{U}_s \cup \mathcal{K}_s \text{ and } |\mathcal{U}_s| = |\mathcal{K}_s|.$$

Each split contained knots for every crossing count $n \in N := \{20, 21, \ldots, 35\}$. For all distinct $a, b \in N$, each split contained an equal number of a-crossing and b-crossing unknot and non-trivial knot diagrams.

Learning Curves

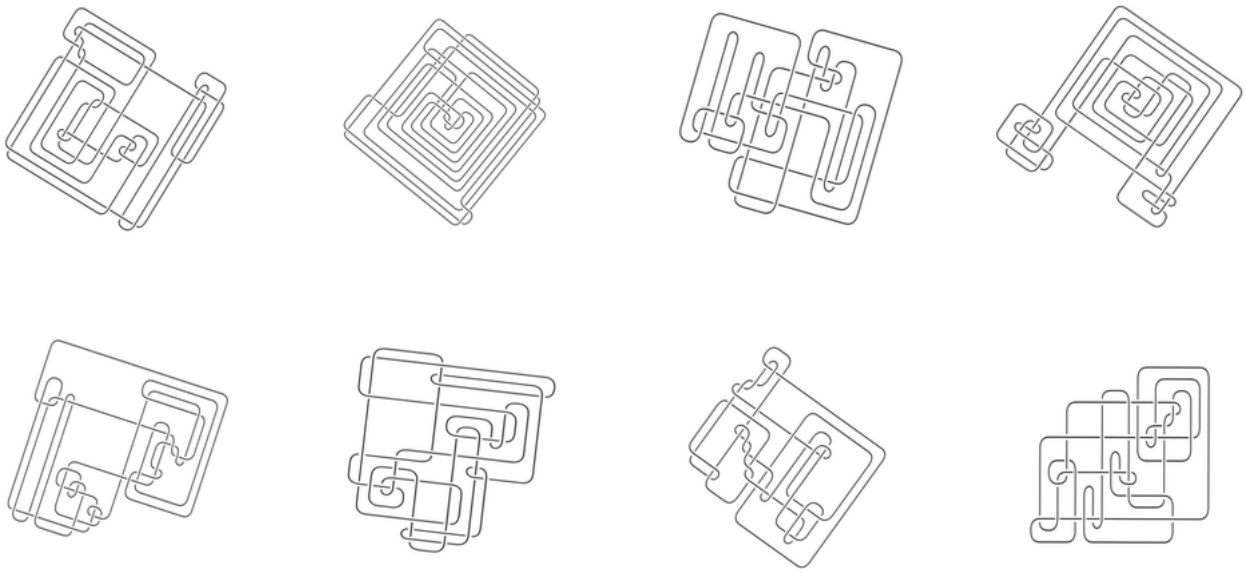

Figure 1: TBC

CNN* Saliency Maps

Saliency maps for knot diagrams in $\mathcal{D}_{\text{test}}$ for the best-performing CNN (CNN*).

CNN* True Positives: True Unknots Predicted as Unknots

CNN* False Negatives: True Unknots Predicted as Knots

CNN* True Negatives: True Knots Predicted as Knots

CNN* False Positives: True Knots Predicted as Unknots

ViT* Saliency Maps

Saliency maps for knot diagrams in $\mathcal{D}_{\text{test}}$ for the best-performing ViT (ViT*).

ViT TP: True Unknots Predicted as Unknots

ViT FN: True Unknots Predicted as Knots

ViT TN: True Knots Predicted as Knots

ViT FP: True Knots Predicted as Unknots