

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 and non-trivial knot diagrams (\mathcal{U} and \mathcal{K}) partitioned into three disjoint splits $S = \{\mathcal{D}_{\text{train}}, \mathcal{D}_{\text{val}}, \mathcal{D}_{\text{test}}\}$, where:

$$\mathcal{D} = \bigcup_{s \in S} s$$

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

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

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

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

Each split in S contained knots with $n \in N := \{20, 21, \dots, 35\}$ crossings. 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

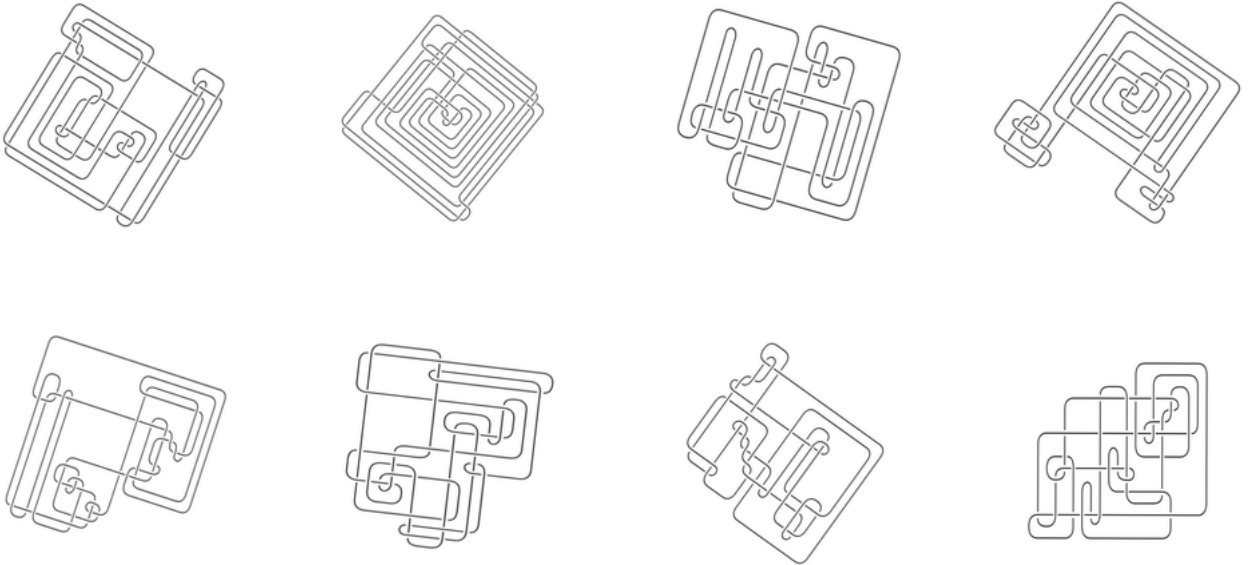


Figure 1: TBC

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