

# Results: [20, 35] Crossings

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

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

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

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

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

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

Each split in  $\mathcal{D}$  contained knots with  $n \in N := \{20, 21, \dots, 35\}$  crossings. For all distinct  $a, b \in N$ , each split in  $S$  contained an equal number of  $a$  and  $b$ -crossing unknot and non-trivial knot diagrams.

## Learning Curves

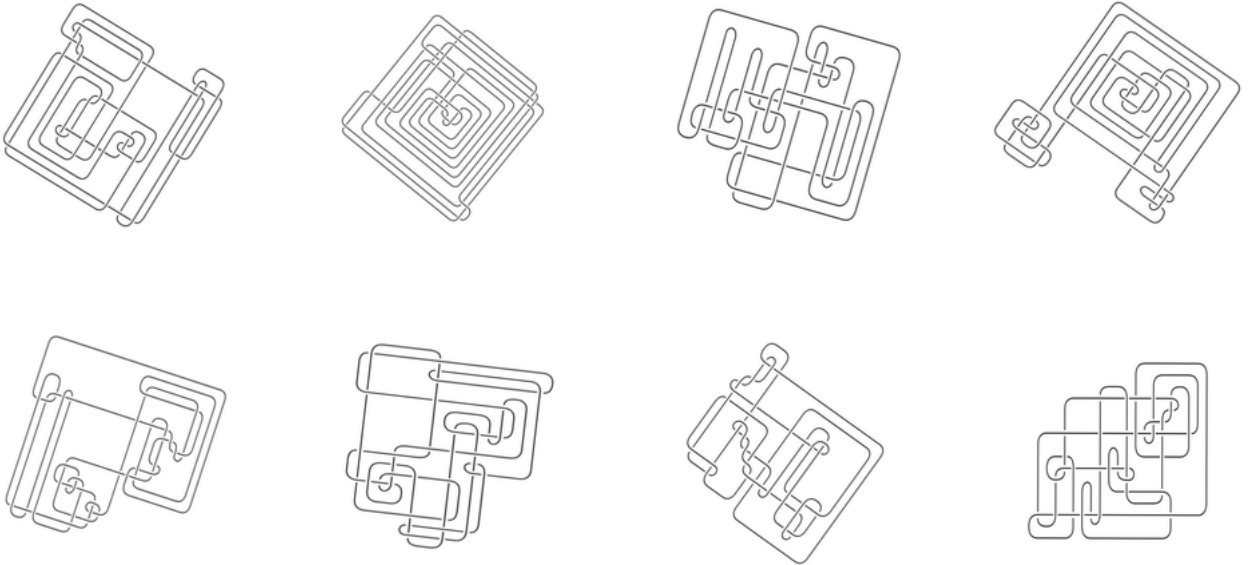


Figure 1: 35 crossing unknots (top row) and non-trivial knots (bottom row) in  $\mathcal{D}_{\text{test}}$ .

## CNN Saliency Maps

Saliency maps for knots in  $\mathcal{D}_{test}$  from the CNN that performed the best on  $\mathcal{D}_{test}$ .

**CNN TP: True Unknots Predicted as Unknots**

**CNN FN: True Unknots Predicted as Knots**

**CNN TN: True Knots Predicted as Knots**

**CNN FP: True Knots Predicted as Unknots**

## ViT Saliency Maps

Saliency maps for knots in  $\mathcal{D}_{test}$  from the ViT that performed the best on  $\mathcal{D}_{test}$ .

**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**