

Results: [20, 35] Crossings

Jake Weatherhead

November 7, 2025

The same CNN and ViT used in the initial study were fine-tuned on a new dataset \mathcal{D} , where:

$$\mathcal{D} = \mathcal{D}_{\text{train}} \cup \mathcal{D}_{\text{val}} \cup \mathcal{D}_{\text{test}}$$

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

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

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

Each split in \mathcal{D} included knots with n crossings where $n \in \{20, 21, \dots, 35\}$. For all values of n , splits contained an equal number of n -crossing unknot and non-trivial knot diagrams.

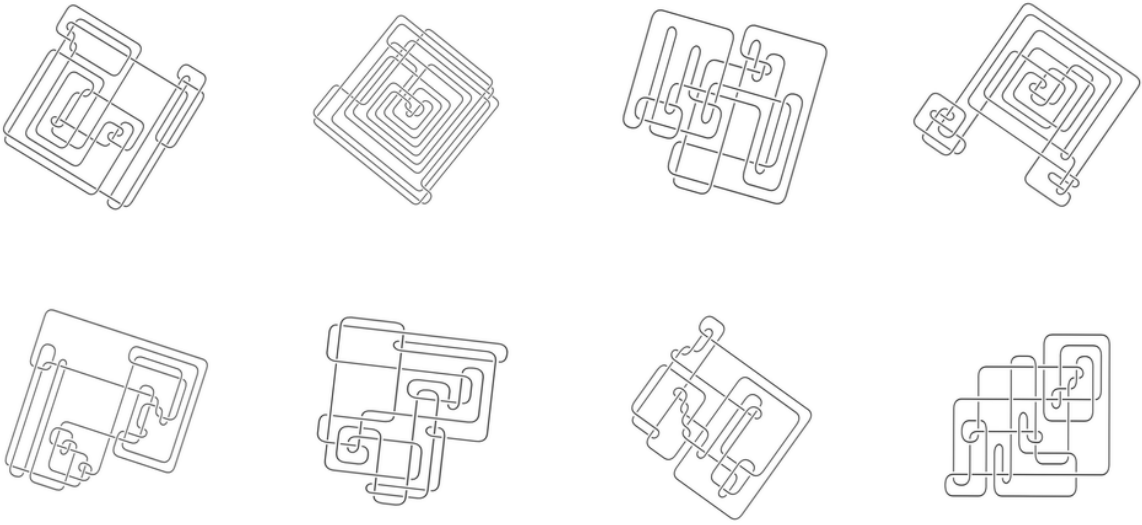


Figure 1: 35 crossing unknots (top row) and non-trivial knots (bottom row) in $\mathcal{D}_{\text{test}}$.

CNN Results

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 Results

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