

# 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:

$$\begin{aligned}\mathcal{D} &= \mathcal{D}_{\text{train}} \cup \mathcal{D}_{\text{val}} \cup \mathcal{D}_{\text{test}} \\ |\mathcal{D}| &= 560,000 \text{ diagrams} \\ |\mathcal{D}_{\text{train}}| &= 448,000 \text{ diagrams} \\ |\mathcal{D}_{\text{val}}| &= |\mathcal{D}_{\text{test}}| = 56,000 \text{ diagrams.}\end{aligned}$$

Each split in  $\mathcal{D}$  included knots with  $n$  crossings, where  $n \in \{20, 21, \dots, 35\}$ . For every  $n$ , the number of diagrams per split was identical, with an equal number of unknots and non-trivial knots.

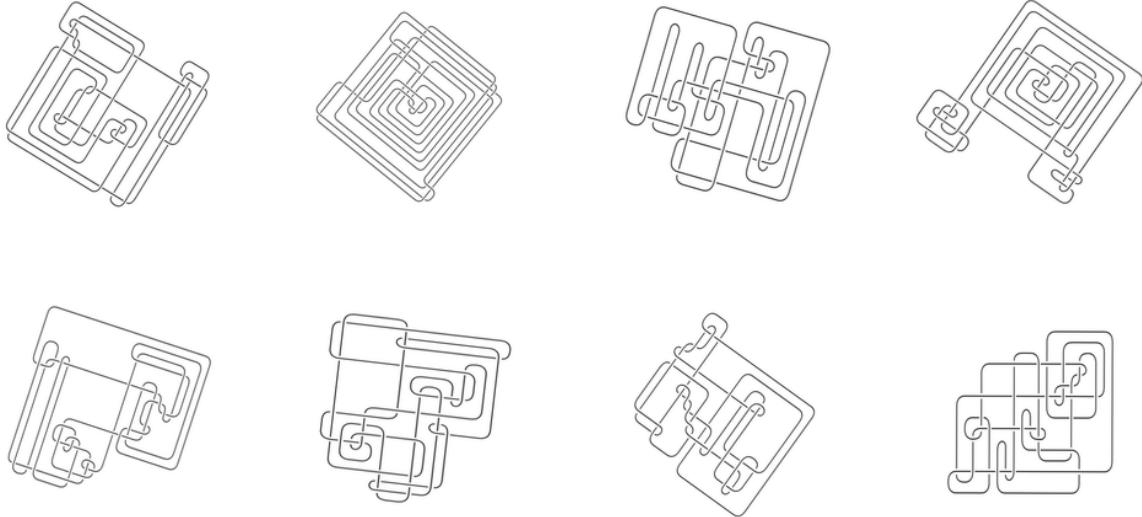


Figure 1: 35 crossing unknots (top row) and non-trivial knots (bottom row) in  $\mathcal{D}_{\text{test}}$ .

## 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