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

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