Deep algebraic-geometric learning — white paper

Yan King Yin general.intelligence@gmail.com

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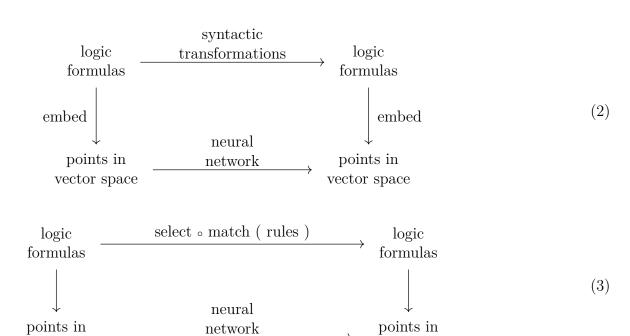**Abstract**

$$\text{rules} = \text{polynomials} \tag{1}$$

The polynomials are constructed with layers.

They can be learned via back-prop, because differentiable.

$$
\begin{array}{ccc}
\begin{array}{c}\text{logic}\\\text{formulas}\end{array} & \xrightarrow{\begin{array}{c}\text{syntactic}\\\text{transformations}\end{array}} & \begin{array}{c}\text{logic}\\\text{formulas}\end{array} \\
\text{embed} \downarrow & & \downarrow \text{embed} \\
\begin{array}{c}\text{points in}\\\text{vector space}\end{array} & \xrightarrow{\begin{array}{c}\text{neural}\\\text{network}\end{array}} & \begin{array}{c}\text{points in}\\\text{vector space}\end{array}
\end{array}
\tag{2}
$$

$$
\begin{array}{ccc}
\begin{array}{c}\text{logic}\\\text{formulas}\end{array} & \xrightarrow{\text{select} \circ \text{match (rules)}} & \begin{array}{c}\text{logic}\\\text{formulas}\end{array} \\
\downarrow & & \downarrow \\
\begin{array}{c}\text{points in}\\\text{vector space}\end{array} & \xrightarrow{\begin{array}{c}\text{neural}\\\text{network}\end{array}} & \begin{array}{c}\text{points in}\\\text{vector space}\end{array}
\end{array}
\tag{3}
$$

$$
\begin{array}{ccc}
\text{polynomials} & \xrightarrow{syntactic} & \text{polynomials} \\
\downarrow & & \downarrow \\
\text{points} & \xrightarrow{NN} & \text{points}
\end{array}
\tag{4}
$$