

Examples for pctex

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‘pctex’ provides some useful commands for working with probabilistic circuits. The main purpose of this is reusability and harmonization of notation.

1 General/Misc

- Log-sum-exp $L \sum_{i=1}^k E$: `\lse{i=1}{k}`
- $\text{poly}(N)$: `\poly{N}`
- Independent RVs $X_1 \perp\!\!\!\perp X_2, X_1 \perp\!\!\!\perp X_2$: `X_1 \indep X_2, \indep{X_1}{X_2}`
- Cond. independent RVs $(X_1 \perp\!\!\!\perp X_2 \mid X_3)$: `(\cindep{X_1}{X_2}{X_3})`

2 General graphs

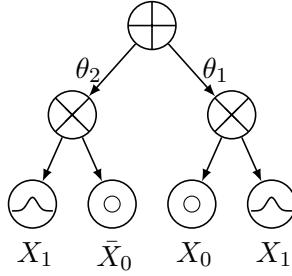
- Graph \mathcal{G} : `\graph`
- Walk \mathcal{W} : `\walk`
- Tree \mathcal{T} : `\tree`
- Vertex set $V(\mathcal{G})$: `\vset(\graph)`
- Edge set $E(\mathcal{G})$: `\eset(\graph)`
- Node/nodes N, \mathbf{N} : `\node`
- Child/children: C, \mathbf{C} : `\child`
- Children of a node: $\text{ch}(N)$: `\ch{\node}`
- Parents of a node: $\text{par}(N)$: `\pa{\node}`
- Neighbours: $\text{neigh}(N)$: `\neigh{\node}`

3 Probabilistic Circuits

- Probabilistic circuit: \mathcal{C} : $\backslash\text{pc}$
- Scope function: $\psi(\mathbf{N})$: $\backslash\text{scope}\{\backslash\text{node}\}$
- v-tree: \mathcal{V} : $\backslash\text{vtree}$
- Sum node/nodes: S, \mathbf{S} : $\backslash\text{snode}, \backslash\text{snodes}$
- Product node/nodes: P, \mathbf{P} : $\backslash\text{pnode}, \backslash\text{pnodes}$
- Leaf node/nodes: L, \mathbf{L} : $\backslash\text{lnode}, \backslash\text{lnodes}$
- Region/regions: A, \mathbf{A} : $\backslash\text{region}, \backslash\text{regions}$
- Partition/partitions: S, \mathbf{S} : $\backslash\text{partition}, \backslash\text{partitions}$
- Region-graph: \mathcal{R} : $\backslash\text{rg}$

4 Tikz / Plotting

Plotting is based on an adaptation of ‘tikzlibraryspn.code.tex’ by Nicola Di Mauro and Antonio Vergari.



Code for the figure above:

```
\begin{tikzpicture}

\sumnode{s1};
\prodnode[below=15pt of s1, xshift=30pt]{p1};
\prodnode[below=15pt of s1, xshift=-30pt]{p2};

\bernoded[below=15pt of p1, xshift=-15pt]{v1}{X_0};
```

```

\bernode[below=15pt of p2, xshift=15pt]{v2}{\bar{X}_0$};

\contnode[below=15pt of p1, xshift=15pt]{v3}{X_1$};
\contnode[below=15pt of p2, xshift=-15pt]{v4}{X_1$};

\weigedge[right] {s1} {p1} {\theta_1$};
\weigedge[left] {s1} {p2} {\theta_2$};

\edge {p1} {v1};
\edge {p2} {v2};
\edge {p1} {v3};
\edge {p2} {v4};

\end{tikzpicture}

```