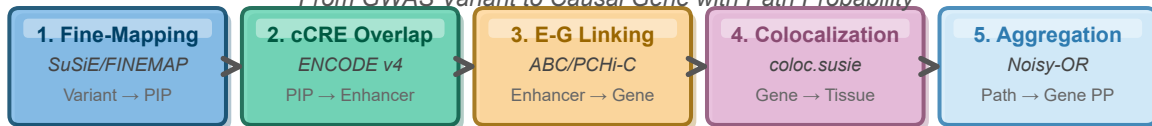
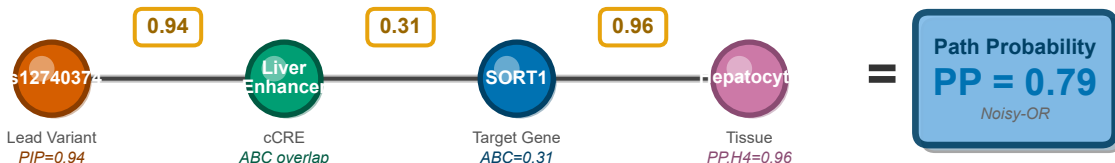


Mechanism-First Causal Graph Framework

From GWAS Variant to Causal Gene with Path Probability



Example: SORT1 Locus (1p13, LDL-Cholesterol)



$$\text{Single Path: } P_{\text{path}} = \text{PIP} \times \text{ABC} \times \text{PP.H4} = 0.94 \times 0.31 \times 0.96 = 0.28$$

$$\text{Gene PP} = \text{Noisy-OR}(\text{all paths}) = 1 - (1-0.28)(1-0.18)(1-0.09)\dots = 0.79$$

Variant

Enhancer

Gene

Tissue