3. Local Consistency Properties

Neighborhood Inverse Consistency (NIC) ensures that every value in the domain of a variable can be extended to a solution in the subproblem induced by the variable and its neighborhood [Freuder & El-Eff, AAAI 1996]

Strong Conservative Dual Consistency (sCDC)
An instantiation \((x,a),(y,b)\) is sCDC iff \((y,b)\) holds in SAC when \(x,a\) and \((x,a)\) holds in SAC when \(y,b\) and \((x,a)\) in scope of some constraint, and the problem is AC [Leecoutre, IIC 2011]

Relational Neighborhood Inverse Consistency (RNIC) ensures that every tuple in every subproblem can be extended to a solution in the subproblem induced on the dual CSP by \([ \{i \} \cup \text{Neigh}(i) \] [Woodward+, AAAI 2011]

- \(wRNIC\), trsRNIC, wrRNIC enforce RNIC on a minimal, triangulated, and minimal triangulated dual graph, respectively.
- \(sRNIC\) automatically selects the RNIC variant based on the density of the dual graph.

\(R^n(i,m)\) ensures that subproblem induced in the dual CSP by every connected combination of \(m\) relations is minimal [Karakashian+, AAAI 2010]

5. Impact on Local Consistency

wRNIC is never strictly stronger than \(R^n(*,3)C\).

wRNIC can never consider more than 3 relations simultaneously.

In either case, it is not possible to have an edge between \(C_1\) and \(C_2\) (a common variable to \(C_1\) and \(C_2\)) while keeping \(C_3\) as a binary constraint.

NIC, sCDC, and RNIC are incomparable.