Seminar Week-7: Constraint Satisfaction Problems

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1) How many solutions are there for the map-colouring problem in the Australia map (see below)? (tip: Start with SA, which can have any of three colours. Then moving clockwise, WA can have either of the other two colours, and everything else is strictly determined; that makes … possibilities for the mainland, times … for Tasmania yields … solutions).
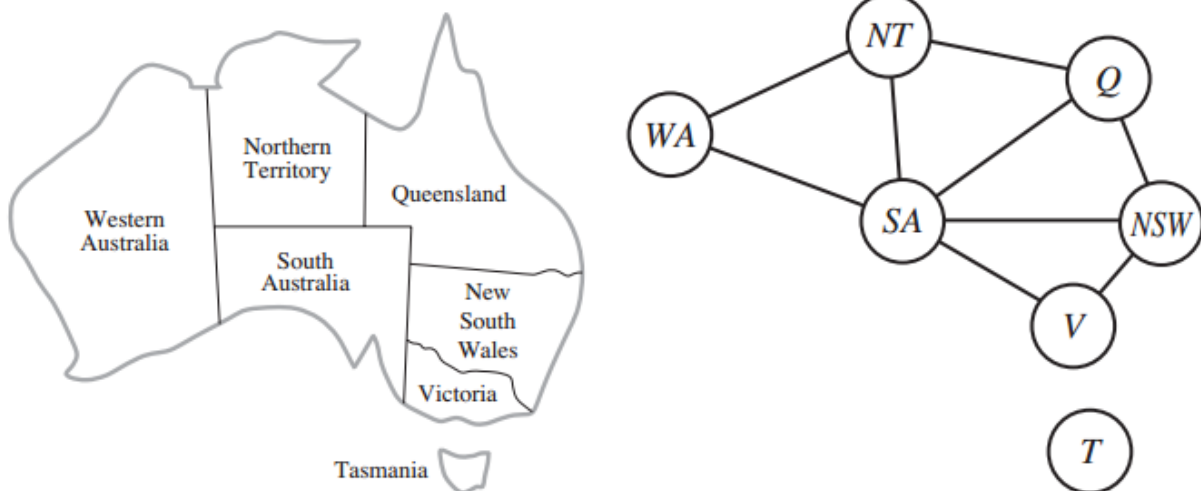
2) Explain why it is a good heuristic to choose the variable that is most constrained but the value that is least constraining in a CSP search.

3) You are in charge of scheduling for computer science classes that meet Mondays, Wednesdays and Fridays. There are 4 classes that meet on these days and 3 professors who will be teaching these classes. You are constrained by the fact that each professor can only teach one class at a time.

      The classes are:

            1. Class 1 - Programming: meets from 8:00-9:00am

            2. Class 2 - Artificial Intelligence: meets from 8:30-9:30am

            3. Class 3 – Machine Learning: meets from 9:00-10:00am

            4. Class 4 - Computer Vision: meets from 9:00-10:00am

The professors are:

1. Professor A, who is qualified to teach Classes 1 and 2.

2. Professor B, who is qualified to teach Classes 3 and 4.

3. Professor C, who is qualified to teach Classes 1, 3, and 4.

Formulate this problem as a constraint-satisfaction problem (CSP) in which there is one variable per class, stating the domains (after enforcing unary constraints), and binary constraints. Constraints should be specified formally and precisely. Draw the constraint graph associated with your CSP.

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