Filtering: Backtracking with Forward Checking

Example:

	WA	NT	Q	NSW	V	SA	T
INTIAL	RGB	RGB	RGB	RGB	RGB	RGB	RGB
NT=R	GB	R	GB	RGB	RGB	GB	RGB
NSW=G	GB	R	B	G	RB	B	RGB
WA=B	B	R	B	G	RB		RGB
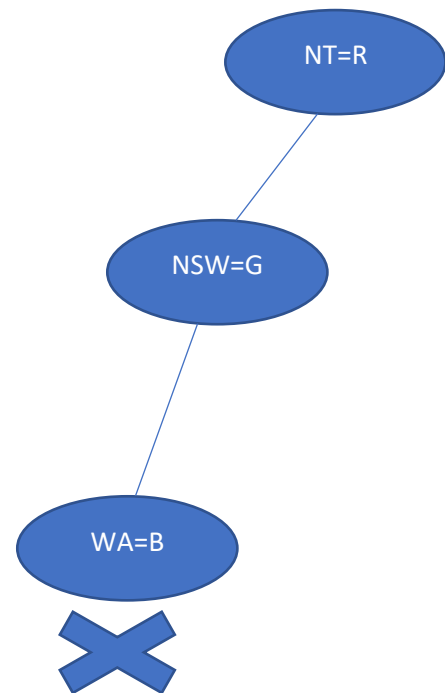
Filtering: Backtracking with Arc Consistency/ Constraint Propagation

Example:

WA=R

Variable and remaining values	Constraints	Constraints
WA = {R}	SA≠WA	WA≠SA
NT= {R, G, B}	SA≠NT	NT≠SA
Q= {R, G, B}	SA≠Q	Q≠SA
NSW= {R, G, B}	SA≠NSW	NSW≠SA
V = {R, G, B}	SA≠V	V≠SA
SA= {R, G, B}	WA≠NT	NT≠WA
T= {R, G, B}	NT≠Q	Q≠NT
	Q≠NSW	NSW≠Q
	NSW≠V	V≠NSW

Values are removed for SA≠WA and NT≠WA

Q=G

Variable and remaining values	Constraints	Constraints
WA = {R}	SA≠WA	WA≠SA
NT= {~~G~~, B}	SA≠NT	NT≠SA
Q= {G}	SA≠Q	Q≠SA
NSW= {R, ~~G~~, B}	SA≠NSW	NSW≠SA
V = {R, G, B}	SA≠V	V≠SA
SA= {~~G~~, ~~B~~}	WA≠NT	NT≠WA
T= {R, G, B}	NT≠Q	Q≠NT
	Q≠NSW	NSW≠Q
	NSW≠V	V≠NSW

Values are removed for SA≠Q, NT≠Q, NSW≠Q and SA≠NT
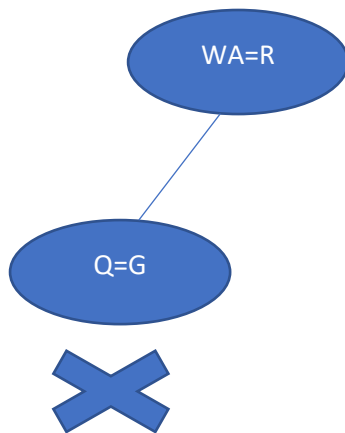
Example (Arc Consistency):

Identify the values of A, B, C so that the following problem becomes **arc consistent**: A= {1,2,3}, B= {1,2,3}, C= {1,2,3} and Constraints: A>B, B=C

V: {A, B, C}

D: A= {1,2,3}, B= {1,2,3}, C= {1,2,3}

C: A>B, B=C

Solution:

Domain	Constraints
A= {~~1~~,2,3}	A>B
B= {1,2,3}	B=C
C= {1,2,3}	B<A
	C=B

Domain	Constraints
A= {2,3}	A>B
B= {1,2,3}	B=C
C= {1,2,3}	B<A
	C=B

Domain	Constraints
A= {2,3}	A>B
B= {1,2,~~3~~}	B=C
C= {1,2,3}	$B<A$
	C=B

Domain	Constraints
A= {2,3}	A>B
B= {1,2}	B=C
C= {1,2,~~3~~}	$B<A$
	C=B

Now A= {2,3}, B= {1,2}, C= {1,2} are arc consistent.

R1≠R2, R1≠R3

R2≠R3, R2≠R4

R3≠R4, R3≠R5

R4≠R5