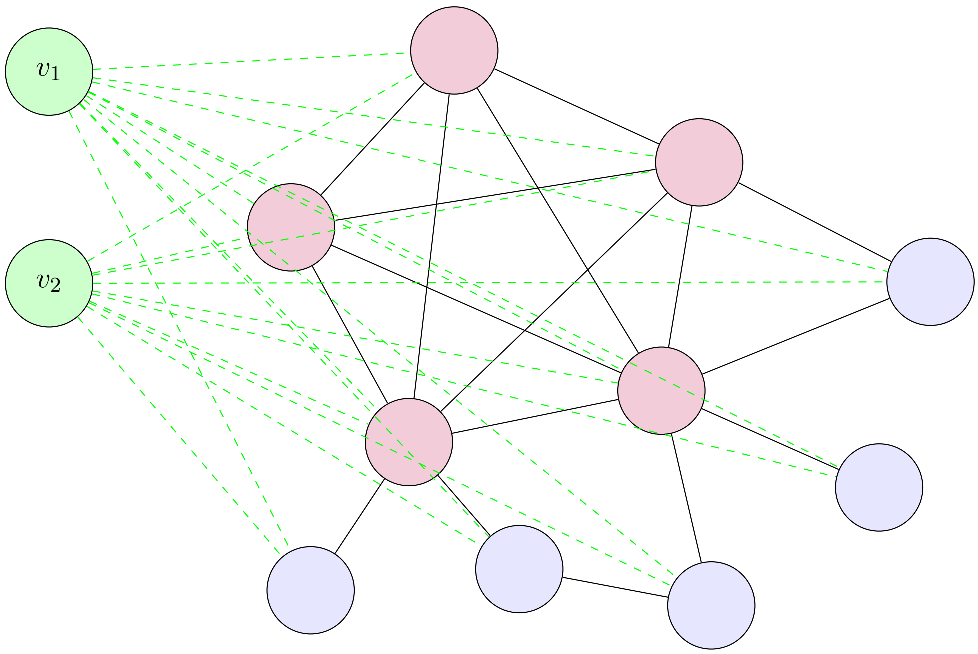
$\LaTeX$ Snippet Compilation

September 24, 2014

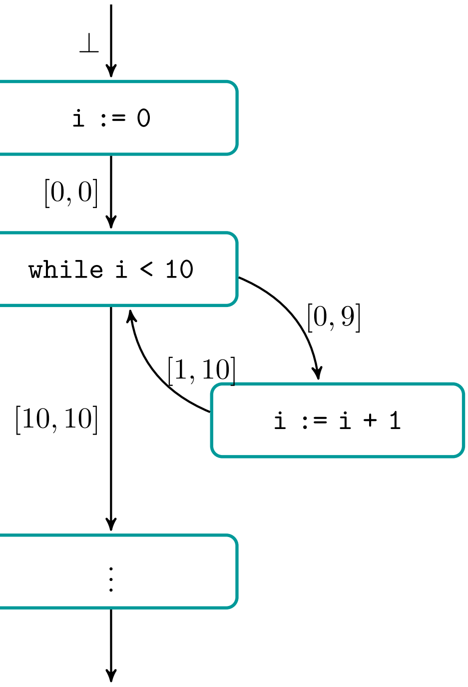
1 TikZ Graphs

Clique

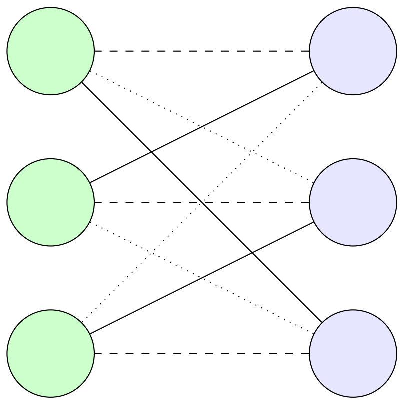


Graph G with clique k_5 highlighted in red and v_1, v_2 connected to every vertex in G. A near clique of size $k + 2$ forms between the red and green colored nodes.

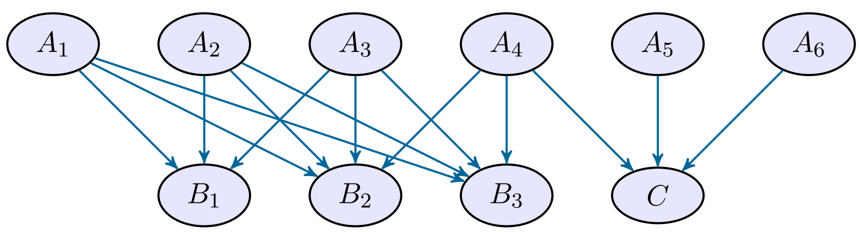
Flow chart style graph



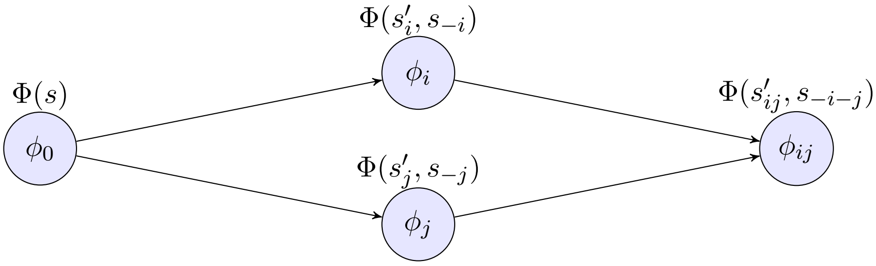
Bipartite Graphs



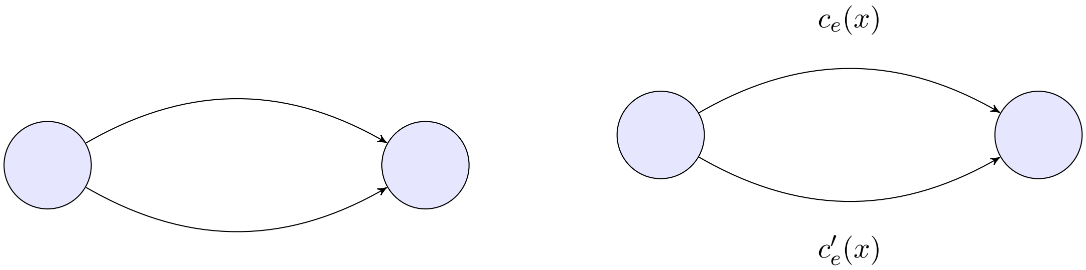
Vertical bipartite, Vertical flow



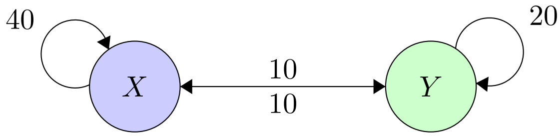
Doubly labeled nodes, Flow Graph



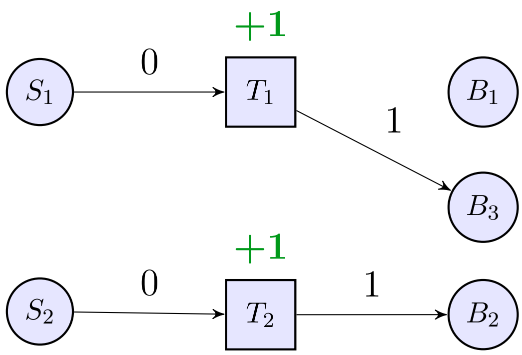
Side by side graphs, bent labeled edges



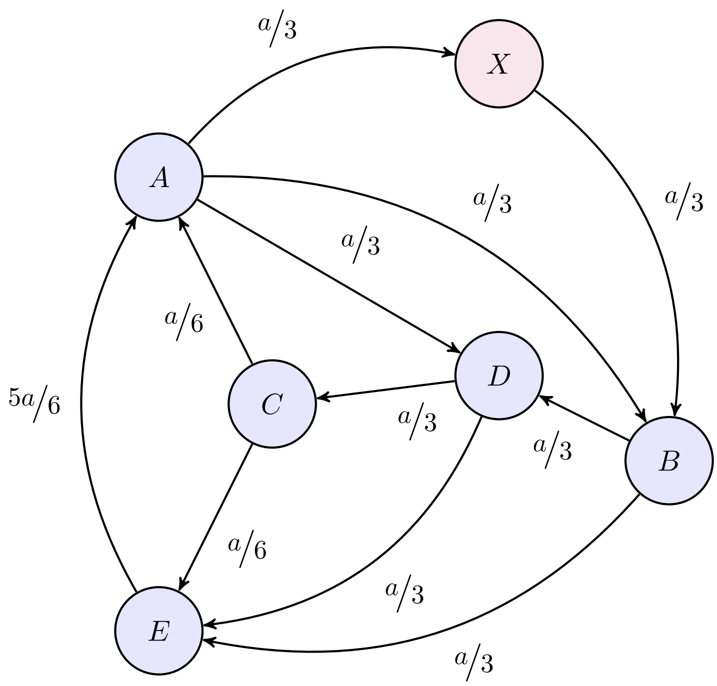
Self Loops



Markets



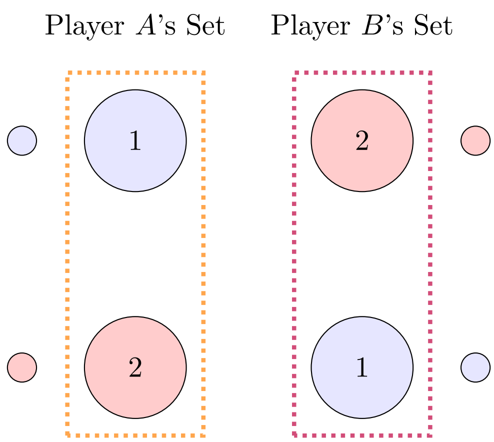
Network



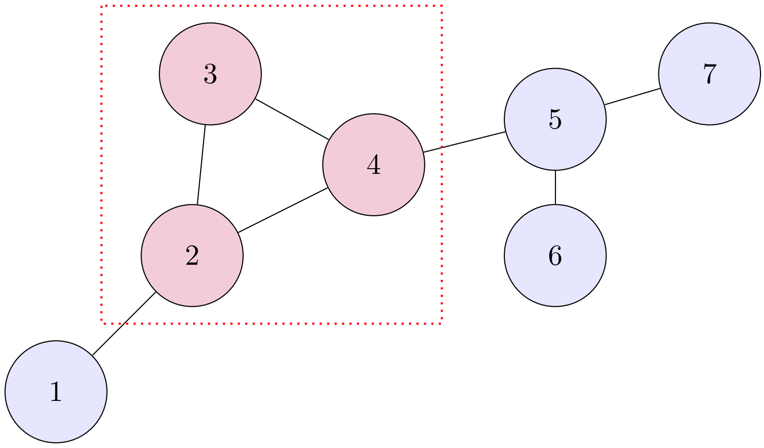
Annotated Graph

$$c_e(s) = \begin{cases} -u_i(s), & x_e = n \\ 0, & \text{otherwise} \end{cases}$$

$$c'_e(s) = \begin{cases} -c_e(s), & x_e = n-1 \\ 0, & \text{otherwise} \end{cases}$$



Subgraph



Graph G with clique k_3 highlighted.

Runtime of σ

Add nodes v_1, v_2:	$O(1)$
Connect v_1, v_2 to $v \, \forall v \in V$:	$O(V)$
Total Reduction Runtime:	$O(V)$

2 Matrices

$$M_k = \begin{bmatrix} 2 & 1 & 1 \\ 1 & 2 & 1 \\ 1 & 1 & 2 \end{bmatrix} \quad M_G = \begin{bmatrix} 2 & 1 & 0 & 0 & 0 & 0 & 0 \\ 1 & 2 & 1 & 1 & 0 & 0 & 0 \\ 0 & 1 & 2 & 1 & 0 & 0 & 0 \\ 0 & 1 & 1 & 2 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 2 & 1 & 1 \\ 0 & 0 & 0 & 0 & 1 & 2 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 2 \end{bmatrix}$$

Runtime of σ

Compute M_k:	$O(k^2)$
Compute M_G:	$O(V^2)$
Total Reduction Runtime:	$O(V^2)$

τ **Reduction:** Construct a function τ that takes the output of σ and converts it to a valid solution of the clique problem:

This is a decision problem with only a boolean output. `True` and `False` map to the same values and the reduction is trivial.

Runtime of τ

Output boolean is equivalent to solution of vertex cover:	$O(1)$
Total Reduction Runtime:	$O(1)$

2.1 Efficient Verifier:

Given a solution set S to the submatrix domination problem, test all values of A into $r(\cdot), c(\cdot)$. If every value of $r(\cdot), c(\cdot)$ matches, then the algorithm should have returned `True`, and if not, then `False`.

Runtime of Verifier

Iterate through m_1 rows and n_1 columns of A:	$O(n_1 m_1)$
Total Runtime:	$O(n_1 m_1)$

3 Runtime table

Runtime of σ

Calculate number of edges:	$O(E)$
Create List L':	$O(E)$
Find M:	$O(1)$
Total Reduction Runtime:	$O(E)$

4 Algorithms

Initialize $t := 0$
Create $g(p, v, time)$ ▷ Returns the current location of Sub
for $s_i = (p_i, v_i) \in S$ **do** ▷ Exhaustively try all possible solutions
    $time := time + 1$
    $location := g(p_i, v_i, time)$
    $hit := f(location)$
    if $hit = 1$ **then** $first\_hit := \{hit, time\}$
    end if
end for
for $s_i = (p_i, v_i) \in S$ **do** ▷ Find Sub location a second time for linear interpolation
    $time := time + 1$
    $location := g(p_i, v_i, time)$
    $hit := f(location)$

if $hit = 1$ **then** $second\_hit := \{hit, time\}$
end if
end for
$(p, v) := Interpolate(first\_hit, second\_hit)$ ▷ Linearly interpolate between known points
return (p, v)

5 Language Semantics

$$\frac{\Psi \,|\, \Theta \,|\, \Delta \,|\, \Gamma \,|\, \vdash s : \hat{\Gamma} \qquad \Psi \,|\, \Theta \,|\, \Delta \,|\, \Gamma, \hat{\Gamma} \vdash e : \texttt{Boolean}\langle\rangle}{\Psi \,|\, \Theta \,|\, \Delta \,|\, \Gamma \,|\, \hat{\Gamma} \vdash \mathbf{do}(s : \hat{\Gamma})\,\mathbf{until}(e)}$$

6 Code and Syntax Highlighting

```java
// Hello.java
import javax.swing.JApplet;
import java.awt.Graphics;

public class Hello extends JApplet {
    public void paintComponent(Graphics g) {
        g.drawString("Hello, world!", 65, 95);
    }
}
```

7 Tables

	<	>	/	=	word
TAG	OPENTAG C CLOSETAG				
C	TAG C, ϵ				word C
EQ					word = word
S		ϵ			EQ S
OPENTAG	<word S>				
CLOSETAG	</ word>				

Diagonal Box

CD \ AB	00	01	11	10
00	1/8	0	1/8	0
01	0	1/8	0	1/8
11	0	1/8	0	1/8
10	1/8	0	1/8	0

Utility Matrices

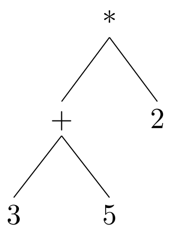
B A	s_1	s_2	s_3
s_1	ϵ 0	ϵ 0	ϵ 0
s_2	0 0	0 0	0 0
s_3	0 0	0 0	0 0

B A	s_1	s_2
s_1	ϵ 0	ϵ 0
s_2	0 0	0 0

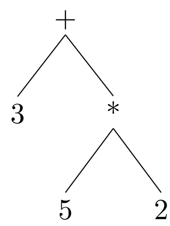
E	2	$2\hat{}3*4+5$
$\rightarrow T_1 E'$	2	$2\hat{}3*4+5$
$\rightarrow T_2\, T_1' E'$	2	$2\hat{}3*4+5$
$\rightarrow N\, T_2' T_1' E'$	2	$2\hat{}3*4+5$
$\rightarrow 2T_2' T_1' E'$	$\hat{}$	$2\hat{}3*4+5$
$\rightarrow 2\hat{}\,T_2 T_1' E'$	3	$2\hat{}3*4+5$
$\rightarrow 2\hat{}\,N T_2' T_1' E'$	3	$2\hat{}3*4+5$
$\rightarrow 2\hat{}3T_2' T_1' E'$	$*$	$2\hat{}3*4+5$
$\rightarrow 2\hat{}3T_1' E'$	$*$	$2\hat{}3*4+5$
$\rightarrow 2\hat{}3*T_1 E'$	4	$2\hat{}3*4+5$
$\rightarrow 2\hat{}3*T_2 T_1' E'$	4	$2\hat{}3*4+5$
$\rightarrow 2\hat{}3*N T_2' T_1' E'$	4	$2\hat{}3*4+5$
$\rightarrow 2\hat{}3*4T_2' T_1' E'$	$+$	$2\hat{}3*4+5$
$\rightarrow 2\hat{}3*4T_1' E'$	$+$	$2\hat{}3*4+5$
$\rightarrow 2\hat{}3*4E'$	$+$	$2\hat{}3*4+5$
$\rightarrow 2\hat{}3*4+E$	5	$2\hat{}3*4+5$
$\rightarrow 2\hat{}3*4+T_1 E'$	5	$2\hat{}3*4+5$
$\rightarrow 2\hat{}3*4+T_2 T_1' E'$	5	$2\hat{}3*4+5$
$\rightarrow 2\hat{}3*4+N T_2' T_1' E'$	5	$2\hat{}3*4+5$
$\rightarrow 2\hat{}3*4+5T_2' T_1' E'$	$\$$	$2\hat{}3*4+5$
$\rightarrow 2\hat{}3*4+5T_1' E'$	$\$$	$2\hat{}3*4+5$
$\rightarrow 2\hat{}3*4+5E'$	$\$$	$2\hat{}3*4+5$
$\rightarrow 2\hat{}3*4+5$	$\$$	$2\hat{}3*4+5$

8 Trees

$((3+5)*2)$



$(3+(5*2))$



9 Piecewise Functions

$$f(n) = \begin{cases} n/2, & \text{if } n \text{ is even} \\ 3n+1, & \text{if } n \text{ is odd} \end{cases}$$

10 Chinese and Foreign Characters

方启明

11 Other Decorations