

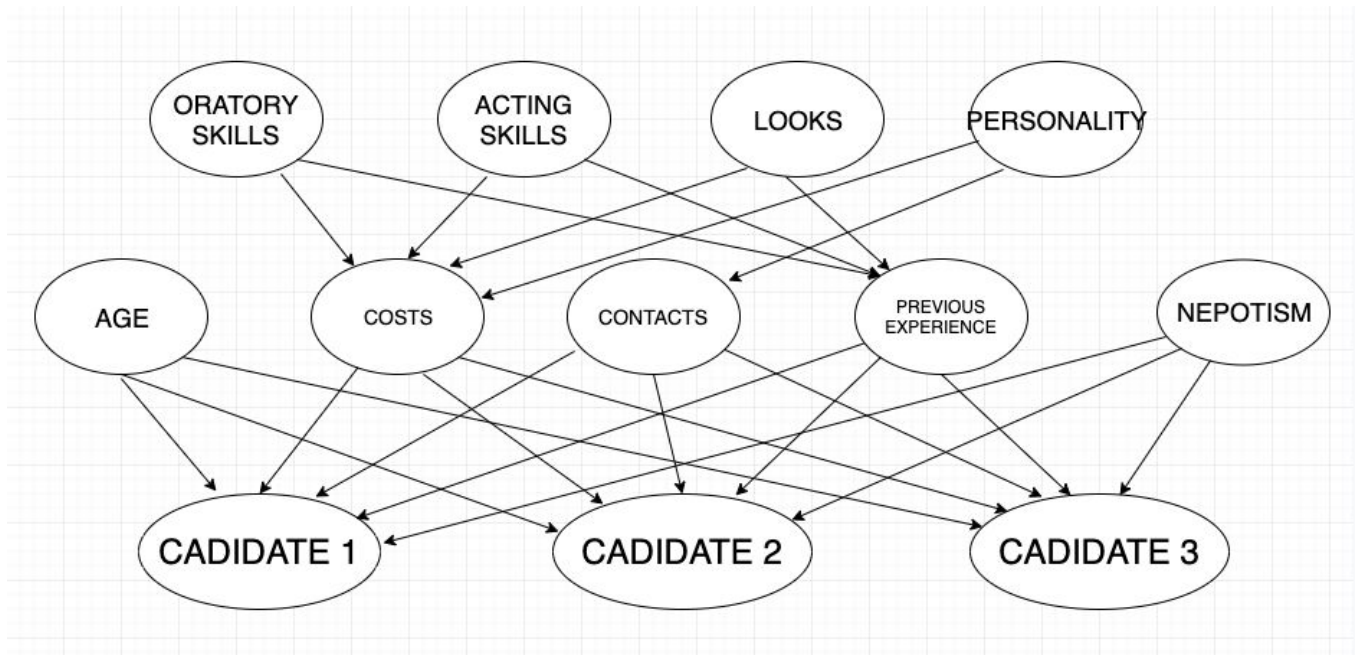
Bayesian Network - Team 6 (HEURISTIC APPROACH)

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QUESTION 9

SOLUTION:



KEY:

OS	ORATORY SKILLS	POOR, GOOD
AS	ACTING SKILLS	POOR, AVERAGE, GOOD
LKS	LOOKS	AVERAGE, GOOD
PN	PERSONALITY	LOW, AVERAGE, GOOD
A	AGE	0-20, 20-40, 40+
CS	COSTS	LOW, MEDIUM, HIGH
CN	CONTACTS	YES, NO
PE	PREVIOUS EXPERIENCE	YES, NO
NP	NEPOTISM	YES, NO

C1 *	CANDIDATE 1	YES, NO
C2 *	CANDIDATE 2	YES, NO
C3 *	CANDIDATE 3	YES, NO

NOTE: * > C2 is middle age. C3 is from a family of big actors while the other two don't have any famous relative.

CONDITIONAL PROBABILITIES TABLE:

ORATORY SKILLS :

OS	POOR	GOOD
P(OS)	0.5	0.5

ACTING SKILLS :

AS	POOR	AVERAGE	GOOD
P(AS)	0.33	0.33	0.33

LOOKS :

LKS	AVERAGE	GOOD
P(LKS)	0.5	0.5

PERSONALITY :

PN	LOW	AVERAGE	GOOD
P(PN)	0.33	0.33	0.33

AGE :

A	0-20	20-40	40+
P(A)	0.3	0.5	0.2

EFFECTIVE COST:

OS	AS	LKS	PN	CS.LOW	CS.MED	CS.HIGH
POOR	POOR	AVERAGE	AVERAGE	0.8	0.15	0.05
POOR	POOR	AVERAGE	GOOD	0.7	0.2	0.1
POOR	POOR	GOOD	AVERAGE	0.7	0.2	0.1

POOR	POOR	GOOD	GOOD	0.6	0.25	0.15
POOR	AVERAGE	AVERAGE	AVERAGE	0.2	0.6	0.2
POOR	AVERAGE	AVERAGE	GOOD	0.1	0.6	0.3
POOR	AVERAGE	GOOD	AVERAGE	0.1	0.6	0.3
POOR	AVERAGE	GOOD	GOOD	0.1	0.5	0.4
POOR	GOOD	AVERAGE	AVERAGE	0.1	0.3	0.6
POOR	GOOD	AVERAGE	GOOD	0.1	0.3	0.6
POOR	GOOD	GOOD	AVERAGE	0.1	0.15	0.75
POOR	GOOD	GOOD	GOOD	0.05	0.15	0.8

GOOD	POOR	AVERAGE	AVERAGE	0.1	0.3	0.6
GOOD	POOR	AVERAGE	GOOD	0.1	0.3	0.6
GOOD	POOR	GOOD	AVERAGE	0.1	0.15	0.75
GOOD	POOR	GOOD	GOOD	0.05	0.15	0.8
GOOD	AVERAGE	AVERAGE	AVERAGE	0.05	0.6	0.45
GOOD	AVERAGE	AVERAGE	GOOD	0.1	0.45	0.45
GOOD	AVERAGE	GOOD	AVERAGE	0.1	0.45	0.45
GOOD	AVERAGE	GOOD	GOOD	0.025	0.125	0.85
GOOD	GOOD	AVERAGE	AVERAGE	0.1	0.45	0.45
GOOD	GOOD	AVERAGE	GOOD	0.025	0.125	0.85
GOOD	GOOD	GOOD	AVERAGE	0.025	0.125	0.85
GOOD	GOOD	GOOD	GOOD	0.005	0.045	0.95

SPECULATED - CONTACTS:

PN	CN.YES	CN.NO
LOW	0.1	0.9
AVERAGE	0.4	0.6

GOOD	0.95	0.05
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PREVIOUS EXPERIENCE (Y / N) :

OS	AS	LKS	PE.YES	PE.NO
POOR	POOR	AVERAGE	0.2	0.8
POOR	POOR	GOOD	0.3	0.7
POOR	AVERAGE	AVERAGE	0.35	0.65
POOR	AVERAGE	GOOD	0.5	0.5
POOR	GOOD	AVERAGE	0.5	0.5
POOR	GOOD	GOOD	0.8	0.2

GOOD	POOR	AVERAGE	0.5	0.5
GOOD	POOR	GOOD	0.8	0.2
GOOD	AVERAGE	AVERAGE	0.7	0.3
GOOD	AVERAGE	GOOD	0.7	0.3
GOOD	GOOD	AVERAGE	0.7	0.3
GOOD	GOOD	GOOD	0.9	0.1

NEPOTISM :

NP	NP.YES	NP.NO
P(NP)	0.2	0.8

CANDIDATE TO CHOOSE OR NOT:

A	CS	CN	PN	NP	C1	C2	C3
0-20	LOW	NO	NO	NO	0.2	0.08	0.1
0-20	LOW	NO	NO	YES	0.4	0.45	0.5
0-20	LOW	NO	YES	NO	0.4	0.25	0.3

0-20	LOW	NO	YES	YES	0.7	0.75	0.8
0-20	LOW	YES	NO	NO	0.4	0.25	0.3
0-20	LOW	YES	NO	YES	0.7	0.75	0.8
0-20	LOW	YES	YES	NO	0.7	0.55	0.6
0-20	LOW	YES	YES	YES	0.95	0.9	0.99
0-20	HIGH	NO	NO	NO	0.01	0.004	0.005
0-20	HIGH	NO	NO	YES	0.2	0.25	0.3
0-20	HIGH	NO	YES	NO	0.2	0.08	0.1
0-20	HIGH	NO	YES	YES	0.5	0.55	0.6

0-20	HIGH	YES	NO	NO	0.2	0.05	0.1
0-20	HIGH	YES	NO	YES	0.5	0.55	0.6
0-20	HIGH	YES	YES	NO	0.5	0.35	0.4
0-20	HIGH	YES	YES	YES	0.8	0.8	0.9

A	CS	CN	PN	NP	C1	C2	C3
20-40	LOW	NO	NO	NO	0.3	0.3	0.2
20-40	LOW	NO	NO	YES	0.5	0.7	0.6
20-40	LOW	NO	YES	NO	0.5	0.55	0.4
20-40	LOW	NO	YES	YES	0.8	0.92	0.9
20-40	LOW	YES	NO	NO	0.5	0.45	0.4
20-40	LOW	YES	NO	YES	0.8	0.92	0.9
20-40	LOW	YES	YES	NO	0.8	0.75	0.7
20-40	LOW	YES	YES	YES	0.95	0.97	0.98
20-40	HIGH	NO	NO	NO	0.05	0.05	0.03
20-40	HIGH	NO	NO	YES	0.3	0.35	0.4
20-40	HIGH	NO	YES	NO	0.3	0.25	0.2
20-40	HIGH	NO	YES	YES	0.6	0.75	0.7

20-40	HIGH	YES	NO	NO	0.3	0.25	0.2
20-40	HIGH	YES	NO	YES	0.6	0.75	0.7
20-40	HIGH	YES	YES	NO	0.6	0.55	0.5
20-40	HIGH	YES	YES	YES	0.85	0.97	0.95

A	CS	CN	PN	NP	C1	C2	C3
40+	LOW	NO	NO	NO	0.15	0.12	0.1
40+	LOW	NO	NO	YES	0.35	0.32	0.45
40+	LOW	NO	YES	NO	0.35	0.32	0.25
40+	LOW	NO	YES	YES	0.65	0.63	0.75
40+	LOW	YES	NO	NO	0.35	0.32	0.25
40+	LOW	YES	NO	YES	0.65	0.63	0.75
40+	LOW	YES	YES	NO	0.65	0.63	0.55
40+	LOW	YES	YES	YES	0.90	0.88	0.98
40+	HIGH	NO	NO	NO	0.005	0.003	0.001
40+	HIGH	NO	NO	YES	0.15	0.12	0.25
40+	HIGH	NO	YES	NO	0.15	0.12	0.1
40+	HIGH	NO	YES	YES	0.45	0.43	0.55

40+	HIGH	YES	NO	NO	0.15	0.12	0.1
40+	HIGH	YES	NO	YES	0.45	0.43	0.55
40+	HIGH	YES	YES	NO	0.45	0.43	0.35
40+	HIGH	YES	YES	YES	0.75	0.72	0.85

JUSTIFICATIONS:

1. Actors of age range 20-40 would be preferred more than any other age category because they would be more experienced and professional than <20 ones and would be younger and hence would have higher chances of being active than 40+

2. Actors scoring low on acting skills , looks and personality usually come with low cost whereas actors scoring high in these areas usually com with higher cost while oratory skills also comprise a minor factor in this.
3. Actors with great personality and communication skills build better and more contacts than anyone else.
4. Experience would definitely improve acting skills and would encourage them to work for better looks, therefore it can also be said the other way round, previous experience would be higher only if the actor has better acting skills, oratory skills.
5. Very few candidates would belong to established actors' familie and hence lower probability for nepotism.
6. Medium cost candidates are pruned in last step because lower cost or higher cost candidates are mostly wanted and there is a very thin layer of medium cost in between lower and higher cost which can be neglected.
7. C2 is middle age, hence has a higher probability of being selected in 20-40 age group actors. C3 is from an influential family and hence will have higher probability when nepotism is considered.

SAMPLE QUERY:

Considering first kind of query i.e : $P(X | p(X), p(p(X)))$

Example :

$$\begin{aligned}
 &P(C = C1 | \text{Contacts} = \text{YES} , \text{Personality} = \text{GOOD}) \\
 &= P(C = C1 | \text{Contacts} = \text{YES}) * P(\text{Contacts} = \text{YES} | \text{Personality} = \text{GOOD}) \\
 &= (14.005/22.845) * 0.95 \\
 &= 0.613044 * 0.95 \\
 &\sim 0.58
 \end{aligned}$$