## Data Mining and Machine Learning

Quiz 3, II Semester, 2023-2024
16 April, 2024

In a nuclear power station, an alarm is triggered when a temperature gauge exceeds a given threshold. The gauge measures the temperature of the core of the reactor. Consider the boolean variables A (alarm sounds), F_A (alarm is faulty), and F_G (gauge is faulty) along with multivalued variables G (gauge reading) and T (actual core temperature).

1. Draw a Bayesian network for this scenario, given that the gauge is more likely to fail when the core temperature gets too high. Explain the structure of your network.

→ Actual core temperature is independent of other reading.

→ Gauge Reading will depend on the actual temperature and whether or not the gauge is faulty.

→ Alarm will sound based on the gauge reading and whether it is faulty.
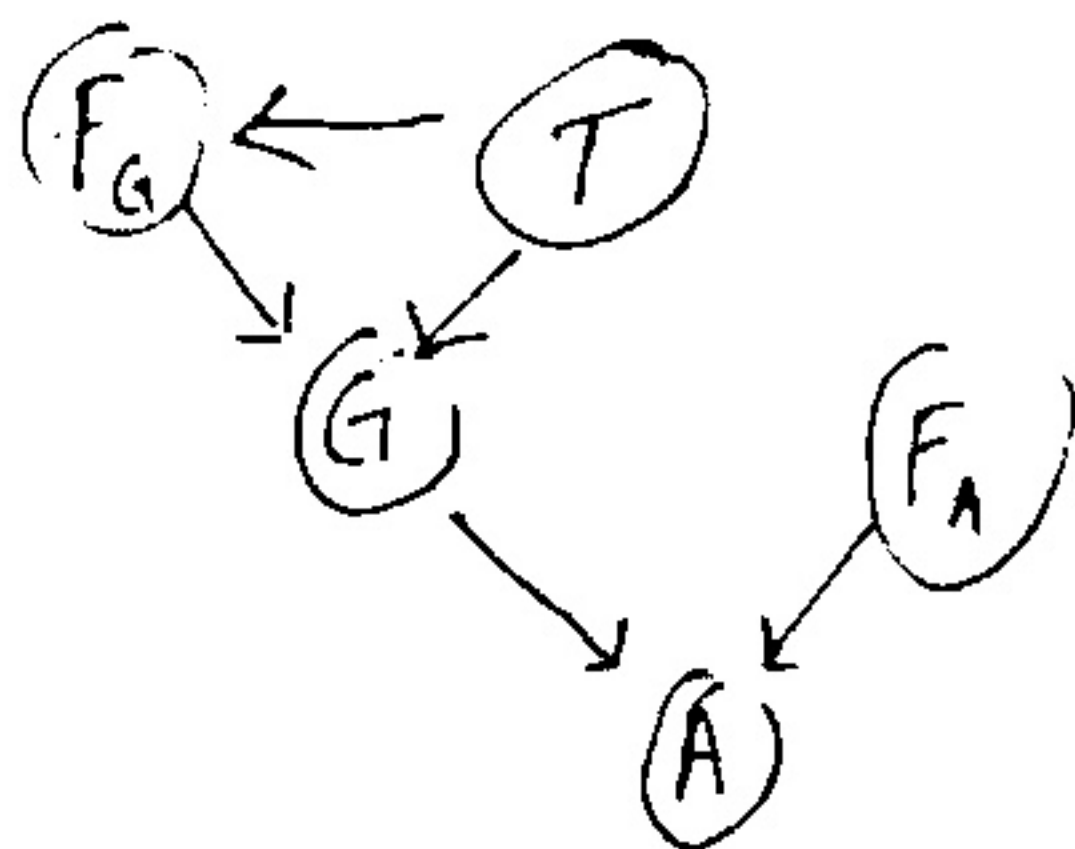
→ Gauge is more likely to be faulty at higher core temp $\Rightarrow$ F_G depends on T

2. Suppose G and T each take just two values, normal and high. Assume that the gauge gives the correct temperature with probability x when it is working and with probability y when it is faulty. Describe the conditional probability table for G.

T	F_G	$P(G = Normal)$	$P(G = High)$
Normal	Not faulty	x	$1-x$
Normal	Faulty	y	$1-y$
High	Not faulty	$1-x$	x
High	Faulty	$1-y$	y