Übung zur Vorlesung

Maschinelles Lernen 1

Wintersemester 2009/2010

Abteilung Maschinelles Lernen
Institut für Softwaretechnik und
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Blatt 14

Abgabe bis Abgabe bis **Mittwoch, den 3. Februar 2010, 14 Uhr** an Mikio Braun (FR6058, notfalls unter der Türe durchschieben).

Aufgaben

1. Box 1 contains 8 apples and 4 oranges. Box 2 contains 10 apples and 2 oranges. Boxes are chosen with equal probability. What is the probability of choosing an apple? If an apple is chosen, what is the probability that it came from box 1?

   (5 Punkte)

2. Prove from first principles the conditionalized version of the general product rule

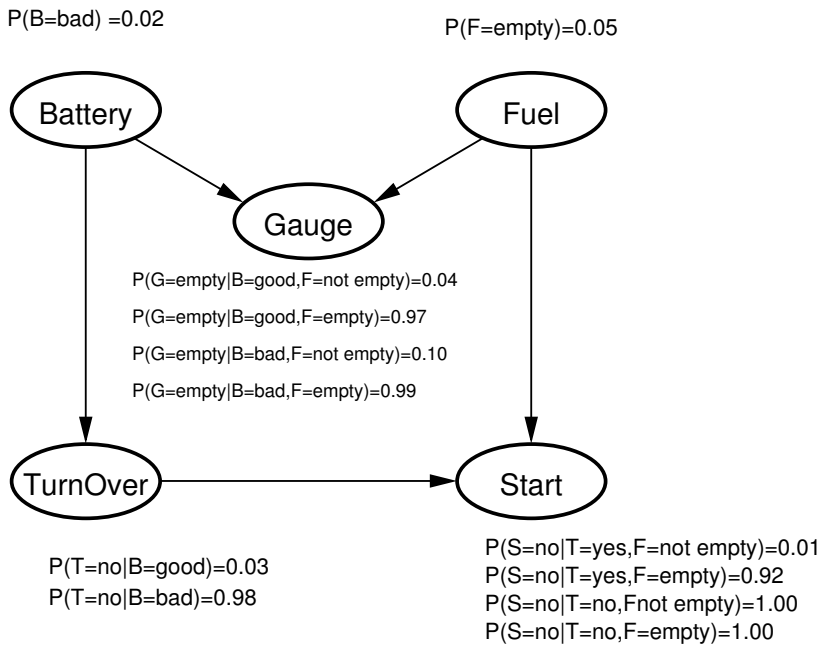
$$P(X, Y|Z) = P(X|Z)P(Y|X, Z) \ . \tag{1}$$

   Also prove the conditionalized version of Bayes' rule

$$P(X|Y, Z) = \frac{P(Y|X, Z)P(X|Z)}{P(Y|Z)} \ . \tag{2}$$

   (10 Punkte)

3. Consider the Bayesian network of binary random variables given below, which concerns the probability of a car starting.



   Calculate $P(Fuel = empty|Start = no)$, the probability of the fuel tank being empty conditioned on the observation that the car does not start. Do this calculation by hand, i.e., do not use or create a computer program to do this.

   (15 Punkte)

Für Fragen zum Übungsblatte bitte in der Google Group http://groups.google.com/group/mikiobraun-lehre registrieren und die Frage an die Mailingliste stellen.