# Techniques of Artificial Intelligence

## Exercises – Naïve Bayes Classifier

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1. **Bayes theorem**
   For the course X, we experienced that on average one out of ten students passes. We also noticed over the last couple of years that from all the students who passed, 90% did attend the exercise sessions. From all the students who did not pass, 95% did not attend the exercise sessions; they preferred to go to the university pub. Are your chances for passing course X increased by attending the exercise sessions?

2. **Bayes theorem**
   An HIV test gives a positive result with probability 98% when the patient is indeed affected by HIV, while it gives a negative result with 99% probability when the patient is not affected by HIV. If a patient is drawn at random from a population in which 0.1% of individuals are affected by HIV and he is found positive, what is the probability that he is indeed affected by HIV?

3. **Naïve Bayes classifier**
   At the parking lot of company X, a lot of cars get stolen. See below for an overview of the last 10 cars which were parked. I now park my brand new RED DOMESTIC SUV, what is the maximum a posteriori hypothesis (MAP): will the car be stolen or not according to a naïve bayes classifier?

| **Example Number** | **Color** | **Type** | **Origin** | **Stolen?** |
|---|---|---|---|---|
| 1 | Red | Sports | Domestic | Yes |
| 2 | Red | Sports | Domestic | No |
| 3 | Red | Sports | Domestic | Yes |
| 4 | Yellow | Sports | Domestic | No |
| 5 | Yellow | Sports | Imported | Yes |
| 6 | Yellow | SUV | Imported | No |
| 7 | Yellow | SUV | Imported | Yes |
| 8 | Yellow | SUV | Domestic | No |
| 9 | Red | SUV | Imported | No |
| 10 | Red | Sports | Imported | Yes |