**Summary**

Googletermen:   
Breadth-first, depth-first, uniform-cost, A\*

Hill Climber, simulated annealing, genetic algorithms

Computationele complexiteit, CS Problem, FOC, CO Problem, Constraint relaxation.

Biologie samenvating  
In 1973 evolutionary biologists Trivers and Willard proposed the following hypothesis, which is known as the Triver-Willard hypothesis; female mammals are able to adjust offspring sex ratio in response to their condition. This hypothesis predicts more male offspring when the mother is in good condition (and thus able to provide a lot of high quality maternal care) and more female offspring when the mother is in poor condition (and thus not able to provide a lot of high quality maternal care). Although this hypothesis is very logical and elegant, studies concerning offspring sex ratio have produced inconsistent results. The Trivers-Willard hypothesis rests on three assumptions (i) parental condition is related to offspring condition, (ii) differences in offspring condition persist into adulthood, and (iii) condition affects the reproductive success of one sex more importantly than the other. The homeostasis hypothesis also deals with offspring sex ratio and it predicts that females produce more of the sex which is rarer in the adult population because this increases their personal fitness the most, it can be seen as a form of negative frequency dependent selection. In this study it was being tested whether mountain goats (*Oreamnos Americanos*) satisfy the second assumption of the Trivers-Willard hypothesis and if so whether the offspring sex ratio follows this or the homeostasis hypothesis. For this study a population of mountain goats was monitored for 25 years, many individual-and population-level variables were measured. The effects of maternal age, social rank, and condition near conception, as well as their interaction with population size, adult sex ratio, and climatic conditions on offspring sex ratio of individually marked females, were examined. Before this study it was known that mountain goats satisfy the first and the third assumption of the Trivers-Willard hypothesis and the data showed that the species also satisfies the second assumption. Condition was measured by observing the social rank, weighing the mass and deciding on the age of an individual. The data showed that offspring sex ratio in mountain goats is affected by an interaction of maternal body condition at conception and adult sex ratio, but only for females in good condition. For mothers in good condition, the probability of producing a son decreased from about 80 to 20 % as the adult sex ratio became more male-biased. For mothers with a low condition index, however, adult sex ratio had no effect on offspring sex ratio. This research is important in the field of evolutionary biology because it shows that a population which intentionally followed the Trivers-Willard hypothesis does not anymore once population size increases. It suggests that many factors, including climate, population size and female condition, play a role in the sex ratio of offspring.

**Concepts**

**Trivers-Willard hypothesis –** This hypotheses proposes that female mammals are able to adjust offspring sex ratio in response to their condition. It predicts more male offspring when the mother is in good condition (and thus able to provide a lot of high quality maternal care) and more female offspring when the mother is in poor condition (and thus not able to provide a lot of high quality maternal care).

**Homeostatic hypothesis –** This hypothesis proposes that females produce more offspring of the rarer sex in the adult population, a form of **negative frequency dependent selection.**

**Sexually dimorphic species –** A species in which the two sexes exhibit different characteristics beyond the sexual organs.

**Offspring sex ratio –** The proportion of male offspring in a population

**Adult sex ratio –** The proportion of male adults in a population

**Negative frequency dependent selection –** An evolutionary process where the fitness of a phenotype decreases as it becomes more common (and vice versa). It is a form of balancing selection.