Monte—Carlo Methods for Computer Vision

There are several ways that Monte Carlo Methods that have been applied to computer vision problems. There are some examples here:

1. Sampling
2. Function Integration
3. Rejection Sampling
4. Particle Filtering
5. Markov Chain Monte Carlo

Monte Carlo Methods can be used in many applications. In the simulation field, it could be used in animation, physical simulation, etc. Then with regard to optimization, we can extend it into generalization of simulated annealing. Last but not least, we also have integration part, which includes Bayesian Statistics(normalizing constants, expectations, marginalization), computing expected utilities and best responses towards Nash equilibria, computing volumes in high—dimensions, computing eigen—functions and values of operators(e.g. Shrodinger's), statistical physics, counting many things as fast as possible. Therefore, in computer vision problems, monte—carlo methods also have many examples here, like sampling, function integration, rejection sampling, particle filtering, and markov chain monte carlo(MCMC) methods.

Simulation:

Animation, Physical Simulation

Optimization: Generalization of simulated annealing

Integration:

Bayesian statistics: normalizing constants, expectations, marginalization
Computing expected utilities and best responses towards Nash equilibria
Computing volumes in high—dimensions
Computing eigen—functions and values of operators(e.g. Shrodinger's)
Statistical physics
Counting many things as fast as possible