

# Index

$C$ , 26, 74, 117, 123, 129–134, 138, 139, 142, 145, 156, 158, 163, 164, 180, 182, 189  
 $CR$ , 156, 158  
 $CW$ , 129–134, 138, 145, 146, 156, 158  
 $\mathcal{E}$ , 24, 35, 36, 40, 74, 180, 182, 201, 207  
 $\epsilon$ -anticipativity, xi  
 $\mathcal{O}$ , 6, 20, 21  
 $\mathcal{R}$ , 27, 35, 40, 41, 75, 156, 158, 163, 164, 180, 182, 189  
 $\mathcal{RR}$ , 156, 158, 163, 164  
 $\mathcal{RW}$ , 156, 158, 163, 164  
AVAILABLE, 22  
FEASIBLE, 22  
LO, 158, 163, 164  
CHOOSEREQUEST, 20  
FILTER, 114  
FIRST, 114  
IDLE, 117, 122  
LAST, 114  
LOCALLOSS, 29  
REGRET-ACCEPT, 81  
REGRET-REJECT, 81  
REGRET-SWAP, 81  
RELATEDNESS, 109  
SAMPLE, 21

---

## a

a priori, optimization, ix, 1, 12, 22  
acceptance, 165  
accepting  
  customers, 125, 164  
  requests, 118, 129  
action, 11  
adaptability, 6  
ambulance  
  dispatching, 2  
  relocation, 2, 168  
anticipative, distribution, 35  
anticipativity, xi, xii, 14, 41, 60, 95, 134, 163, 208, 210  
anticipatory  
  algorithm, 4  
  gap, 203, 209  
  relaxation, xi, 10, 26, 41, 202  
arrival, time, 105  
artificial intelligence, 11

---

## b

backward algorithm, 178  
Baum-Welch algorithm, 172, 175, 178–179, 182  
belief state, 12, 172, 174  
best-fit heuristic, 90  
black-box, 6, 10  
bushfire, 4

---

## c

cancellation, 77  
choice, error, 204, 205  
combinatorial, 8  
competitive  
  algorithm, 50  
  analysis, 6  
  ratio, 6, 168  
concatenation, 22  
consensus, 145, 153, 156–158, 165  
  algorithm, 26, 74  
continuous  
  online optimization, 171  
  optimization, 185  
customer service, 130

---

## d

data, historical, 131  
deadline, 104  
decision, irrevocable, 11  
degree of dynamism, 130, 131, 153, 158, 167  
departure, time, 105, 116  
depot, 103  
deviation, standard, 43  
discontinuous, 8  
discount, 11, 196  
discrepancy, search, 111  
dispatching, vehicle, 103, 127, 153  
distance, travel, 130  
distribution, 22  
dominance, 48  
dynamism, 153, 158, 167

---

**e**

earliest  
 return time, 106  
 service time, 106  
 endogenous, 12  
 equivalence, 196  
 ergodic, 185  
 exogenous, xii, 2, 12  
 expectation algorithm, 24, 74  
 expected  
 local loss, 203, 204  
 loss 35  
 problem, 91

---

**f**

failures in power grid, 3  
 finite horizon, 11  
 forward algorithm, 177

---

**g**

G, 23  
 generative model, 12  
 greedy, 23, 127, 165–167  
 algorithm, 50  
 guarantee, service, 118

---

**h**

heuristic  
 best-fit, 90  
 insertion, 129  
 hidden Markov model, 172–174  
 historical  
 averaging, 185  
 data, 4, 131, 149, 185  
 sampling, 186  
 horizon, 11

---

**i**

idle, 117  
 immediate decision, 30, 117  
 importance of optimization, 132  
 infinite horizon, 11  
 insertion heuristic, 129  
 inventory control, 6  
 irrevocable decision, 11

---

**k**

knapsack, 81

---

**l**

latest  
 arrival time, 106  
 departure time, 106  
 LDS, 111  
 learning, xii, 171  
 learning, machine, 131  
 limited discrepancy search, 111  
 LNS, 107, 112, 129  
 LO, 24, 142  
 local  
 error, 36  
 loss, 29, 203  
 optimization, 24, 129, 142, 156

---

**m**

machine learning, 4, 131, 171  
 Markov  
 Chance-Decision Process, 182  
 Decision-Chance Process, 195  
 decision process, xi, 11  
 model, 45, 171  
 MAX-SAT, 32  
 MCDP, xi, 12, 14, 195  
 MDCP, xi, 14, 194  
 MDP, xi, 11, 195  
 Monte-Carlo sampling, 8  
 multiknapsack, 79  
 multiple plans, 125, 129  
 multistage stochastic programming, 10, 23, 25

---

**n**

nearest neighbor, 129, 139, 167  
 neighborhood search, 107  
 neighbor, nearest, 129, 139, 167  
 neighborhood, 107  
 NN, 129, 133, 139  
 noise, 131  
 noisy distribution, 58  
 nonanticipativity, 65  
 constraints, 9, 10, 25  
 nonconvex, 8

---

**o**

oblivious algorithm, 23, 129  
 observation, 12  
 offline problem, 20, 71  
 online  
   algorithm, 6  
   anticipatory algorithm, x, xi, 4, 5, 199, 200  
   optimization, ix, 1  
   problem, 20, 72  
   stochastic combinatorial optimization, x, 2, 5, 10  
 operations research, 4, 11  
 optimal policy, 12  
 optimization, local, 127, 129, 132, 142  
 OSCO, x  
 over-optimization, 130, 145  
 overbooking, 80

---

**p**

packet scheduling, 45, 180, 188  
 pandemic, containment, 3  
 partially observable  
   Markov decision process, 12, 182  
   Markov model, 173  
 pathological, 6, 130  
 periodic optimization, 185  
 plan, routing, 104, 105, 133  
 pointwise decisions, 122, 124  
 policy, 12, 195  
 POMDP, 12, 182, 212  
 precomputation, 60, 116  
 prefix, 114

---

**r**

recourse, 7, 9–11, 23  
 regret, 29, 153, 156–158, 163–165  
   algorithm, 27, 75  
 rejecting  
   customers, 125, 164  
   requests, 118, 129  
 relocation, 109, 153, 155, 158, 163, 167, 168  
   strategy, 121  
 reservation  
   systems, 71, 79  
 reward, 11  
 robustness, 15, 131  
 rollout, 168  
 route, 105  
 routing  
   plan, 104, 105, 133  
   vehicle, 103, 153, 188

---

**s**

SAA, 8, 10  
 Sample Average Approximation Method, 8  
 sampling, 6, 14, 132, 172  
   historical, 186  
   horizon, 58  
   Monte-Carlo, 8  
 scalability, 56  
 scenario, 22–24, 26  
 scheduling, 19  
 sequence, 22  
 sequential decision making, xi, 4, 11  
 service  
   customer, 130  
   guarantee, 11, 118, 129  
   time, 105  
 shuffling, 46  
 simulation, 196  
 Solomon, 112, 153–155, 167  
 standard, deviation, 43  
 stochastic  
   integer programming, 8  
   linear programming, 7  
   programming, 7, 25  
 strategy  
   relocation, 121, 153, 155, 158, 163, 165, 167, 168  
   waiting, 120, 129, 145, 153, 155, 158, 164, 165, 167  
 suboptimality approximation, 28, 29, 31, 51, 75, 81, 156  
 suffix, 114  
 Sum-Of-Squares algorithm, 6  
 swapping, 82

---

**t**

time, windows, 104, 153–156, 165–168  
 tradeoff between sampling and optimization, 96  
 training, 179  
 transition, 11, 12  
 travel distance, 130

---

**u**

uncertainty, ix–xiii, 1–4, 6, 7, 11, 12, 14, 22, 23, 193

---

**v**

value of stochastic information, 14  
 vehicle, 104  
   dispatching, 103, 106, 127, 153  
   routing, 103, 106, 153, 188

---

**w**

waiting, 153, 155, 158, 163–165, 167  
strategy, 120, 129, 145, 152