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Python implementation of algorithms from Russell And Norvig's "Artificial Intelligence - A Modern Approach"

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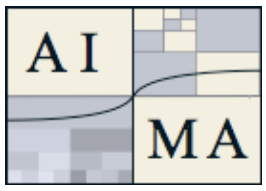
MrDupin committed with norvig Knowledge Notebook: Version Space Learning (#598) ... Latest commit b102884 3 days ago

aima-data @ 6ce56c0	Implemented fol_fc_ask() (#535)	2 months ago
images	Knowledge Notebook: Current-Best Learning (#594)	3 days ago
js	Added TicTacToe to notebook (#213)	a year ago
tests	Knowledge Notebook: Version Space Learning (#598)	3 days ago
.flake8	Fix flake8 warnings (#508)	2 months ago
.gitignore	Add .gitignore	a year ago
.gitmodules	Rollback to one folder organization	a year ago
.travis.yml	Learning Notebook: Iris/MNIST Visualization + Learner Evalutation (#568)	a month ago
CONTRIBUTING.md	Add pytest.ini to main directory (#548)	2 months ago
LICENSE	Include MIT license	a year ago
README.md	Knowledge: Version-Space Learning (#596)	3 days ago
agents.ipynb	Completed BlindDog agent examples (#350)	5 months ago
agents.py	Minor Cosmetic Changes to Agents (#556)	a month ago
csp.ipynb	Learning, CSP and Games Notebook Headers (#574)	29 days ago
csp.py	Removed errors to make the build pass (#418)	2 months ago
games.ipynb	Learning, CSP and Games Notebook Headers (#574)	29 days ago
games.py	Games Notebook: Move Visualization + Small Fix (#570)	a month ago
index.ipynb	adds 4th edition search notebook	a year ago
intro.ipynb	Update intro.ipynb fixing single minor typo (#470)	4 months ago
ipyviews.py	Fix flake8 for main files (#399)	4 months ago
knowledge.ipynb	Knowledge Notebook: Version Space Learning (#598)	3 days ago
knowledge.py	Knowledge: Version-Space Learning (#596)	3 days ago
learning.ipynb	Split Learning Notebook (#590)	13 days ago
learning.py	Implementation: Current Best Learning (#593)	8 days ago
logic.ipynb	Added KBs to logic notebook (#575)	29 days ago
logic.py	Added KBs to logic notebook (#575)	29 days ago
mdp.ipynb	Add Contents to MDP and CSP Notebooks (#565)	a month ago
mdp.py	Moving Grid to Utils (#540)	2 months ago
neural_nets.ipynb	Split Learning Notebook (#590)	13 days ago
nlp.ipynb	NLP Notebook: Languages (#586)	8 days ago
nlp.py	NLP Notebook: Languages (#586)	8 days ago
notebook.py	Learning Notebook: Iris/MNIST Visualization + Learner Evalutation (#568)	a month ago
planning.ipynb	Planning notebook (#506)	2 months ago
planning.py	Fix flake8 warnings (#508)	2 months ago

probability-4e.ipynb	Update probability-4e.ipynb	a year ago
probability.ipynb	Added Section on Approximate Inference	a year ago
probability.py	Changes for python3 string formating (#471)	4 months ago
pytest.ini	Add pytest.ini to main directory (#548)	2 months ago
requirements.txt	Record necessary dependency for test (#476)	4 months ago
rl.ipynb	Contents for RL and Search Notebooks (#567)	a month ago
rl.py	RL Fixes (Fixing Build) (#519)	2 months ago
search-4e.ipynb	Pytest Warnings Fix + Open Data Files Update (#547)	2 months ago
search.ipynb	Contents for RL and Search Notebooks (#567)	a month ago
search.py	Search: Bidirectional Search (#554)	2 months ago
text.ipynb	Text Notebook: Information Extraction (#584)	8 days ago
text.py	Text Notebook: Information Retrieval (#576)	24 days ago
utils.py	Implementation: Current Best Learning (#593)	8 days ago

README.md



aima-python

build passing launch binder

Python code for the book *Artificial Intelligence: A Modern Approach*. You can use this in conjunction with a course on AI, or for study on your own. We're looking for solid contributors to help.

Python 3.4

This code is in Python 3.4 (Python 3.5 and later also works, but Python 2.x does not). You can install the latest Python version or use a browser-based Python interpreter such as repl.it. You can run the code in an IDE, or from the command line with `python -i` *filename* `.py` where the `-i` option puts you in an interactive loop where you can run Python functions.

In addition to the *filename* `.py` files, there are also *filename* `.ipynb` files, which are Jupyter (formerly Ipython) notebooks. You can read these notebooks, and you can also run the code embedded with them. See jupyter.org for instructions on setting up a Jupyter notebook environment.

Structure of the Project

When complete, this project will have Python code for all the pseudocode algorithms in the book. For each major topic, such as `logic`, we will have the following three files in the main branch:

- `logic.py`: Implementations of all the pseudocode algorithms, and necessary support functions/classes/data.
- `logic.ipynb`: A Jupyter (IPython) notebook that explains and gives examples of how to use the code.
- `tests/test_logic.py`: A lightweight test suite, using `assert` statements, designed for use with `py.test`, but also usable on their own.

Index of Algorithms

Here is a table of algorithms, the figure, name of the algorithm in the book and in the repository, and the file where they are implemented in the repository. This chart was made for the third edition of the book and needs to be updated for the upcoming fourth edition. Empty implementations are a good place for contributors to look for an issue. The aima-pseudocode project describes all the algorithms from the book. An asterisk next to the file name denotes the algorithm is not fully implemented.

Figure	Name (in 3rd edition)	Name (in repository)	File
2.1	Environment	`Environment`	`agents.py`
2.1	Agent	`Agent`	`agents.py`
2.3	Table-Driven-Vacuum-Agent	`TableDrivenVacuumAgent`	`agents.py`
2.7	Table-Driven-Agent	`TableDrivenAgent`	`agents.py`
2.8	Reflex-Vacuum-Agent	`ReflexVacuumAgent`	`agents.py`
2.10	Simple-Reflex-Agent	`SimpleReflexAgent`	`agents.py`
2.12	Model-Based-Reflex-Agent	`ReflexAgentWithState`	`agents.py`
3	Problem	`Problem`	`search.py`
3	Node	`Node`	`search.py`
3	Queue	`Queue`	`utils.py`
3.1	Simple-Problem-Solving-Agent	`SimpleProblemSolvingAgent`	`search.py`
3.2	Romania	`romania`	`search.py`
3.7	Tree-Search	`tree_search`	`search.py`
3.7	Graph-Search	`graph_search`	`search.py`
3.11	Breadth-First-Search	`breadth_first_search`	`search.py`
3.14	Uniform-Cost-Search	`uniform_cost_search`	`search.py`
3.17	Depth-Limited-Search	`depth_limited_search`	`search.py`
3.18	Iterative-Deepening-Search	`iterative_deepening_search`	`search.py`
3.22	Best-First-Search	`best_first_graph_search`	`search.py`
3.24	A*-Search	`astar_search`	`search.py`
3.26	Recursive-Best-First-Search	`recursive_best_first_search`	`search.py`
4.2	Hill-Climbing	`hill_climbing`	`search.py`
4.5	Simulated-Annealing	`simulated_annealing`	`search.py`
4.8	Genetic-Algorithm	`genetic_algorithm`	`search.py`
4.11	And-Or-Graph-Search	`and_or_graph_search`	`search.py`
4.21	Online-DFS-Agent	`online_dfs_agent`	`search.py`
4.24	LRTA*-Agent	`LRTAStarAgent`	`search.py`
5.3	Minimax-Decision	`minimax_decision`	`games.py`
5.7	Alpha-Beta-Search	`alphabeta_search`	`games.py`
6	CSP	`CSP`	`csp.py`
6.3	AC-3	`AC3`	`csp.py`
6.5	Backtracking-Search	`backtracking_search`	`csp.py`
6.8	Min-Conflicts	`min_conflicts`	`csp.py`
6.11	Tree-CSP-Solver	`tree_csp_solver`	`csp.py`
7	KB	`KB`	`logic.py`
7.1	KB-Agent	`KB_Agent`	`logic.py`
7.7	Propositional Logic Sentence	`Expr`	`logic.py`
7.10	TT-Entails	`tt_entials`	`logic.py`
7.12	PL-Resolution	`pl_resolution`	`logic.py`

Figure	Name (in 3rd edition)	Name (in repository)	File
7.14	Convert to CNF	`to_cnf`	`logic.py`
7.15	PL-FC-Entails?	`pl_fc_resolution`	`logic.py`
7.17	DPLL-Satisfiable?	`dpll_satisfiable`	`logic.py`
7.18	WalkSAT	`WalkSAT`	`logic.py`
7.20	Hybrid-Wumpus-Agent	`HybridWumpusAgent`	`logic.py` *
7.22	SATPlan	`SAT_plan`	`logic.py`
9	Subst	`subst`	`logic.py`
9.1	Unify	`unify`	`logic.py`
9.3	FOL-FC-Ask	`fol_fc_ask`	`logic.py`
9.6	FOL-BC-Ask	`fol_bc_ask`	`logic.py`
9.8	Append		
10.1	Air-Cargo-problem	`air_cargo`	`planning.py`
10.2	Spare-Tire-Problem	`spare_tire`	`planning.py`
10.3	Three-Block-Tower	`three_block_tower`	`planning.py`
10.7	Cake-Problem	`have_cake_and_eat_cake_too`	`planning.py`
10.9	Graphplan	`GraphPlan`	`planning.py`
10.13	Partial-Order-Planner		
11.1	Job-Shop-Problem-With-Resources	`job_shop_problem`	`planning.py`
11.5	Hierarchical-Search	`hierarchical_search`	`planning.py`
11.8	Angelic-Search		
11.10	Doubles-tennis	`double_tennis_problem`	`planning.py`
13	Discrete Probability Distribution	`ProbDist`	`probability.py`
13.1	DT-Agent	`DTAgent`	`probability.py`
14.9	Enumeration-Ask	`enumeration_ask`	`probability.py`
14.11	Elimination-Ask	`elimination_ask`	`probability.py`
14.13	Prior-Sample	`prior_sample`	`probability.py`
14.14	Rejection-Sampling	`rejection_sampling`	`probability.py`
14.15	Likelihood-Weighting	`likelihood_weighting`	`probability.py`
14.16	Gibbs-Ask	`gibbs_ask`	`probability.py`
15.4	Forward-Backward	`forward_backward`	`probability.py`
15.6	Fixed-Lag-Smoothing	`fixed_lag_smoothing`	`probability.py`
15.17	Particle-Filtering	`particle_filtering`	`probability.py`
16.9	Information-Gathering-Agent		
17.4	Value-Iteration	`value_iteration`	`mdp.py`
17.7	Policy-Iteration	`policy_iteration`	`mdp.py`
17.7	POMDP-Value-Iteration		
18.5	Decision-Tree-Learning	`DecisionTreeLearner`	`learning.py`
18.8	Cross-Validation	`cross_validation`	`learning.py`
18.11	Decision-List-Learning	`DecisionListLearner`	`learning.py` *

Figure	Name (in 3rd edition)	Name (in repository)	File
18.24	Back-Prop-Learning	`BackPropagationLearner`	`learning.py`
18.34	AdaBoost	`AdaBoost`	`learning.py`
19.2	Current-Best-Learning	`current_best_learning`	`knowledge.py`
19.3	Version-Space-Learning	`version_space_learning`	`knowledge.py`
19.8	Minimal-Consistent-Det		
19.12	FOIL		
21.2	Passive-ADP-Agent	`PassiveADPAgent`	`rl.py`
21.4	Passive-TD-Agent	`PassiveTDAgent`	`rl.py`
21.8	Q-Learning-Agent	`QLearningAgent`	`rl.py`
22.1	HITS	`HITS`	`nlp.py`
23	Chart-Parse	`Chart`	`nlp.py`
23.5	CYK-Parse	`CYK_parse`	`nlp.py`
25.9	Monte-Carlo-Localization		

Index of data structures

Here is a table of the implemented data structures, the figure, name of the implementation in the repository, and the file where they are implemented.

Figure	Name (in repository)	File
3.2	romania_map	`search.py`
4.9	vacumm_world	`search.py`
4.23	one_dim_state_space	`search.py`
6.1	australia_map	`search.py`
7.13	wumpus_world_inference	`logic.py`
7.16	horn_clauses_KB	`logic.py`
17.1	sequential_decision_environment	`mdp.py`
18.2	waiting_decision_tree	`learning.py`

Acknowledgements

Many thanks for contributions over the years. I got bug reports, corrected code, and other support from Darius Bacon, Phil Ruggera, Peng Shao, Amit Patil, Ted Nienstedt, Jim Martin, Ben Catanzariti, and others. Now that the project is on GitHub, you can see the contributors who are doing a great job of actively improving the project. Many thanks to all contributors, especially @darius, @SnShine, @reachtarunhere, @MrDupin, and @Chipe1.

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