Symbols

2APL programming language 176, 179, 180, 181, 182, 184, 185
3DiTeams simulation environment 119, 135

A

abstraction 70, 77, 79, 82, 85
Active Worlds (AW) 138, 140, 141, 143, 145, 146, 147, 149, 150, 152, 153, 154, 157, 160, 161, 162, 163, 168, 169
Active Worlds Educational Universe (AWEDU) 143, 145, 169
affective computing 190, 204
Affective Reasoner project 193, 196, 203
agency features 248, 250, 268
agency, proactivity features of 251
agent-based modeling (ABM) 1, 2, 3, 4, 5, 12, 13, 14, 15, 18, 21, 24
agent-based simulation 125
agent-based simulations 6
agent languages 70, 71
AgentLink Special Interest Groups 94
agents and multi-agent systems (AMAS) 26, 27, 28, 29, 30, 31, 38, 47, 48
agents, biology-inspired 29
agents technology 250, 270
Amazon Auctions 255
analyst role 62
Ant Colony Optimization 29, 33
anthropomorphic characteristics 189, 192
anxiety-confidence 191

A-Officer 174, 181, 182, 183
AppEdTech learning environment 120, 122
application programming interface (API) 72, 73, 77, 85
architectures 71, 72, 76, 79, 82, 83, 85, 86
artificial intelligence (AI) 27, 28, 29, 48, 49, 50, 89, 90, 91, 92, 93, 94, 98, 99, 100, 101, 102, 173, 187, 190, 207, 210, 227, viii, v, 249, 251, 252, 255
Artificial Life 29
Artificial Neural Net model 12, 24
Asimovian agents 110
Asimov, Isaac 105, 109, 110, 112, 113
Association for Advancement of Artificial Intelligence (AAAI) 110, 112
Association of Computer Machinery (ACM) 91
auctions 104, 108, 113, 114
auctions, sequential 104, 108, 113
author goals 208
authorial intentions 208
Automatic subtitles 95
avatars 95, 116, 117, 119, 120, 121, 137, 138, 141, 142, 145, 147, 160, 208, 211, 215
AW, citizens 141
AW, tourists 141

B

Bartle, Richard 116
BDI agents 71, 76
Belief-desire-intention (BDI) 105
belief-desire-intention (BDI) cognitive model 26, 29, 30, 31, 33, 34, 35, 37, 38, 39, 42, 43, 44, 45, 47, 48, 49, 71, 76, 103, 105, 113, 172, 176, 177, 178, 179, 183, 184, 185
Belief-desire-intention (BDI) concepts 105
bifocal modeling 21
binary search 7
Bio-Networking 29
blackboards 29
border security system (BOSS) 210, 226
bots 143, 154
Bratman, Michael E. 176, 178, 185
breadth-first search 7
business management 90

C
C# 71, 72, 73
C++ 71
camera objects 143
cameras 208
CARIM system 174
cascading Style Sheets (CSS) 236
case-based reasoning (CBR) 209
Cathexis Model 193
classroom games 101, 102, 104, 107, 108, 111, 113
close action 180
Close Air Support (CAS) 125
cloud computing 3
cognitive dimensions framework (CDF) 70, 73, 83, 84
collaborative filtering (CF) 240, 251, 253, 254, 255, 259, 265
collaborative virtual environments (CVE) 141
communication 137, 138, 139, 140, 160, 161
competition 248, 250, 255, 256, 258, 268, 271
computational thinking 3, 21
computer-based training resources 207
computer-based training system 207
computer-based training systems 207
computer-mediated communication (CMC) 119
computer science (CS) 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 18, 20, 21, 22, 23, 26, 27, 28, 89, 90, 91, 96, 99, 100, 101, viii, v, 102, 103, 104, 108, 110, 111
computer science education 2, 3, 4, 5, 6, 9, 18, 21, 23
computer science education, content-based reforms 4

computer science education, pedagogy-based reforms 4
computer supported collaborative work (CSCW) 53
Computing Curricula 2001 for Computer Science by the Joint Task Force of ACM and IEEE 91
cognitive tools 102, 103, 104
content-based filtering 239, 240
content-based fit content (CBF) 251, 253, 254, 255, 265
Contract Net protocol 29, 30, 43
collaboration 250, 268
coordination 250, 270
create action 180
creative effort 52, 53, 59
creative performance 52, 53
creativity 51, 52, 53, 54, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67
creativity, investment theory of 52
creativity metrics 52, 53, 54, 59, 60, 62, 63, 65
creativity metrics, elaboration 53, 60, 63, 64
creativity metrics, flexibility 53, 60, 63, 64
creativity metrics, fluency 53, 60, 63, 64
creativity metrics, originality 53, 60, 63, 64, 65
creativity support tools (CST) 53
cultures 189, 190
curricula 102, 103

d
data agents 243
decision theory 103, 104, 107, 108
Defense Advanced Research Projects Agency (DARPA) 118
demographic filtering 253
depth-first search 7
deterministic/centralized (DC) mindset 2, 22, 23
dispirited-encouraged mindset 191
distributed programming 5
divergent thinking 53
Dred Scott Supreme Court decision 109

E
eBay 255
educators 89, 90, 91
<table>
<thead>
<tr>
<th>Term</th>
<th>Page(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ekman, Paul</td>
<td>190, 203</td>
</tr>
<tr>
<td>e-learning</td>
<td>233, 234, 235, 236, 237, 238, 239, 242, 243, 244, 246</td>
</tr>
<tr>
<td>e-learning application</td>
<td>191</td>
</tr>
<tr>
<td>e-learning applications</td>
<td>189, 201</td>
</tr>
<tr>
<td>e-learning environments</td>
<td>188, 189, 193, 196</td>
</tr>
<tr>
<td>e-Learning Management System</td>
<td>93</td>
</tr>
<tr>
<td>e-learning systems (ELS)</td>
<td>234</td>
</tr>
<tr>
<td>emergence</td>
<td>2, 21</td>
</tr>
<tr>
<td>emotional behaviour</td>
<td>189, 190, 191, 192, 193, 200</td>
</tr>
<tr>
<td>emotional expressions</td>
<td>192, 193, 194, 195, 198</td>
</tr>
<tr>
<td>emotional intelligence</td>
<td>189, 201</td>
</tr>
<tr>
<td>emotions</td>
<td>188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 201, 203, 204, 205</td>
</tr>
<tr>
<td>emotions, anger</td>
<td>190, 197</td>
</tr>
<tr>
<td>emotions, disgust</td>
<td>190</td>
</tr>
<tr>
<td>emotions, fear</td>
<td>190</td>
</tr>
<tr>
<td>emotions, joy</td>
<td>190</td>
</tr>
<tr>
<td>emotions, sadness</td>
<td>190</td>
</tr>
<tr>
<td>emotions, surprise</td>
<td>190</td>
</tr>
<tr>
<td>ennu-fascination</td>
<td>191</td>
</tr>
<tr>
<td>entrepreneurship</td>
<td>90, 91, 92, 94, 97</td>
</tr>
<tr>
<td>E-Officer</td>
<td>174, 181, 182, 183</td>
</tr>
<tr>
<td>ethnography</td>
<td>84</td>
</tr>
<tr>
<td>Eve Online</td>
<td>118</td>
</tr>
<tr>
<td>EverQuest</td>
<td>118</td>
</tr>
<tr>
<td>evolutionary biology</td>
<td>12</td>
</tr>
<tr>
<td>F</td>
<td></td>
</tr>
<tr>
<td>feature augmentation hybrid type</td>
<td>241</td>
</tr>
<tr>
<td>FIPA ACL standard</td>
<td>28, 30, 33, 36, 37, 38, 43, 44, 47, 49</td>
</tr>
<tr>
<td>FIPA-OS</td>
<td>28</td>
</tr>
<tr>
<td>first-person viewpoint</td>
<td>117</td>
</tr>
<tr>
<td>folk psychology</td>
<td>178</td>
</tr>
<tr>
<td>frustration-euphoria</td>
<td>191</td>
</tr>
<tr>
<td>fuser</td>
<td>75, 80, 81, 82</td>
</tr>
<tr>
<td>fuzzy agents</td>
<td>242</td>
</tr>
<tr>
<td>fuzzy cognitive agents</td>
<td>237</td>
</tr>
<tr>
<td>fuzzy information</td>
<td>242</td>
</tr>
<tr>
<td>fuzzy logic</td>
<td>29, 237, 242</td>
</tr>
<tr>
<td>G</td>
<td></td>
</tr>
<tr>
<td>game theory</td>
<td>103, 104, 107, 108</td>
</tr>
<tr>
<td>gaze behavior</td>
<td>183</td>
</tr>
<tr>
<td>generalized partial global planning (GPGP)</td>
<td>55, 68</td>
</tr>
<tr>
<td>generative drama management</td>
<td>208, 210</td>
</tr>
<tr>
<td>genetic algorithms</td>
<td>29</td>
</tr>
<tr>
<td>goal hierarchies</td>
<td>208</td>
</tr>
<tr>
<td>Google</td>
<td>7, 14, 15, 19</td>
</tr>
<tr>
<td>graphical issue-based information systems (gIBIS)</td>
<td>55, 58, 66</td>
</tr>
<tr>
<td>Graphical Issue-Based Information Systems (gIBIS)</td>
<td>55</td>
</tr>
<tr>
<td>H</td>
<td></td>
</tr>
<tr>
<td>H-Officer</td>
<td>174</td>
</tr>
<tr>
<td>human computer interaction (HCI)</td>
<td>189, 191, 201</td>
</tr>
<tr>
<td>humiliated-proud</td>
<td>191</td>
</tr>
<tr>
<td>I</td>
<td></td>
</tr>
<tr>
<td>ICT Policy</td>
<td>90</td>
</tr>
<tr>
<td>information management agents</td>
<td>62</td>
</tr>
<tr>
<td>Institute of Electrical and Electronics Engineers (IEEE)</td>
<td>91, 100</td>
</tr>
<tr>
<td>intelligent agents (IA)</td>
<td>27, 28, 29, 30, 46, 55, 56, 89, 90, 91, 92, 93, 94, 99, 101, 102, 103, 109, 111, 172, 173, 174, 184, 186, viii, v, 249</td>
</tr>
<tr>
<td>Intelligent Emotional Agents (IEAs)</td>
<td>188, 189, 192, 197, 198, 201</td>
</tr>
<tr>
<td>Intentional stance</td>
<td>173</td>
</tr>
<tr>
<td>intention stack</td>
<td>34, 35, 37, 44</td>
</tr>
<tr>
<td>interaction</td>
<td>137, 138, 142, 144, 148, 151, 155, 157, 158, 160, 161, 170</td>
</tr>
<tr>
<td>interactivity</td>
<td>208, 210, 224</td>
</tr>
<tr>
<td>introspection</td>
<td>251</td>
</tr>
<tr>
<td>issue-based information systems (IBIS)</td>
<td>54, 55, 58, 67</td>
</tr>
<tr>
<td>Issue-Based Information Systems (IBIS)</td>
<td>54</td>
</tr>
<tr>
<td>J</td>
<td></td>
</tr>
<tr>
<td>JADE</td>
<td>28, 71, 78</td>
</tr>
<tr>
<td>JadeX</td>
<td>28</td>
</tr>
<tr>
<td>JAM</td>
<td>34, 49</td>
</tr>
<tr>
<td>Jason</td>
<td>28, 48</td>
</tr>
</tbody>
</table>
Java agent development (JADE) framework 237, 242
Java programming language 6, 21, 28, 31, 32, 34, 47, 71, 72, 73, 75, 84, 85, 140, 145, 146, 159
"Just Another Ordinary Day" scenario 95

K
knowledge-based learning environment 126, 128
knowledge-based systems (KBS) 29, 92
knowledge communication 29
Knowledge Society 90
knowledge technologies 91, 92, 93, 94, 97, 98, 100
Knowledge Technologies for Innovation (KTI) course 91, 92

L
learning objects (LO) 235
learning scenarios 206, 207, 208, 209, 210, 211, 215, 216, 218, 222, 224, 225, 231
Leonardo da Vinci project 234, 235, 245
Lisp approach 32, 72, 73, 82
"Little Lost Robot" 105
Lkit tool kit 82
Logo tradition 6
Lua programming language 210, 212, 215, 216, 218, 219, 225
Lucene library 241, 243

M
machine learning 29
machinima 208
managed learning environments (MLE) 234, 235, 239, 244
Managing Strategic Change 90
massively multi-user online role-playing games (MMORPG) 116
mediator agents 243
MessageListeners 75, 76
meta-level hybrid type 241
Microsoft 1
mind maps 53
Minority Report 106
Mission Rehearsal Exercise System (MRE) 209
mobile learning (m-learning) 233, 235, 247
Mobile learning (M-learning) 235
monitoring agents 243
mover objects 143
MSc in Technology, Innovation and Entrepreneurship (TIE) 90
MUD, object-oriented (MOO) 116
multi-agent introduction to computer science (MAgICS) framework 1, 2, 3, 4, 5, 6, 13, 14, 15, 20, 21
multi-agent reward system 51, 52, 59
multi-agent systems (MAS) 1, 2, 3, 5, 6, 12, 13, 14, 16, 18, 19, 20, 21, 26, 38, 42, 46, 49, 70, 72, 73, 74, 76, 77, 78, 79, 83, 84, 85, 86, 90, 100, 101, 102, 103, 104, 108, 111, 113, 189, 242, 243, 249, 269
multimodal dialog (MMD) systems 70, 71, 72, 73, 75, 79, 80, 82, 83, 85
multimodal dialog systems (MMD) 70
multi-platform software 71
Multiple Agents Systems (MAS) 189
multi-user dungeons (MUD) 116, 129, 136
multi-user virtual military environments 118
multi-user virtual online learning environments (MUVOLE) 120
mutual exclusion semaphores 3
MUVE agent platforms 140
MUVE for rehabilitation (MUVER) systems 118, 119, 134

N
narrative paradox 209
natural language input 95
natural language processing 82, 207
Net Environment for Embodied Conversational Agents (NECA) 209, 232
NetLogo entities 31, 32, 49
NetLogo entities, observer 31, 32
NetLogo entities, patches 31, 32, 33, 39
NetLogo entities, turtles 31, 32, 39
NetLogo language 5, 6, 7, 13, 14, 21, 24, 25, 26, 27, 28, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 46, 47, 48, 49, 50, 71, 97, 100
non-local effects 55

O

object orientation 70
object-oriented system 150
ontologies 28, 189
Open Cobalt 138, 140, 141, 145, 147, 149, 150, 151, 157, 159, 160, 161, 162, 163
Oz Project 193

P

PageRank algorithm 6, 7, 8, 9, 14, 15, 16, 19, 24
parallelism 2, 3, 5, 18
partially observable markov decision problems (POMDPs) 103, 112, 113
particle emitters 143
peer-to-peer network architecture 150, 152
peer-to-peer (P2P) networks 3
persona effect 207, 227, 230
personal assistant agents 237
personalised avatars (PAV) 141
personalised recommendation education system (PeRES) 237
personalised ubiquitous learning platform (PULP) 233, 234, 235, 237, 238, 239, 240, 241, 242, 243, 244
Personalised Ubiquitous Learning Platform (PULP) 234
physical settings 189
planning 207
plot elements 208
pocket Internet explorer 236
prisoner’s dilemma 107, 108
privilege passwords (priv pass) 141
profile representation 252
profit sharing plan (PSP) 56, 61
Project Wonderland 138, 140, 141, 145, 146, 147, 148, 152, 157, 159, 160, 161, 162, 163, 167, 170
Prolog 179

Protege 28

Q

Q-learning mechanism 56
Quakebots 184, 186
QUEST technique 208, 209

R

Rashid, Rick 1, 23
real-time interaction 117, 136
real-time remote application 150
recommender agents 243, 248, 251, 252
recursive agent modeling 104, 105
relationships 189, 191, 194
relevance feedback 252
ReplyListeners 75, 76
ripple down rules (RDR) 210, 215, 216, 224, 225, 226
Ripple Down Rules (RDR) 210, 215
risk aversion 104, 107
River City learning environment 121, 122, 131
RoboCup 28, 48
robotics 102, 104, 105, 106, 109, 113, 114
role-playing games (RPG) 116
Roomba 249
rule-based systems 29
"RUNAROUND" 105

S

science education 138, 139
science fiction materials 101, 102, 104, 105, 106, 107, 108, 109, 110, 111, 113, 114
searching 1, 2, 3, 7, 12, 15
Second Life 117, 118, 120, 121, 123, 129, 132, 133
self-awareness 251
Semantic Web 91, 92, 93
sequential search 7
SEREBRO, interface agent 60, 62, 63, 64, 65
SEREBRO, reputation agent 60, 61, 62, 63
SEREBRO, role agent 60, 61, 62
SEREBRO, scoring agent 60, 62, 63, 64
SEREBRO, system agent 60, 62
SEREBRO Web application 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 67
serial programming 5
service oriented architecture (SOA) 250
SIMNET technology 118
simulation theory 175, 176, 177, 184, 185, 186
Snodgrass, Melinda 109
social behavior 172, 173, 176, 177, 178, 182, 184
social behaviour 188, 191, 193
social manipulation 178, 183, 185
social networking 3
social networks 59
socio-cultural awareness training 208
software development kits (SDK) 143, 150, 163
software engineering 52, 102
speaker agent 79
Squeak programming language 140, 150, 151, 152, 162
Star Trek: The Next Generation 105, 109
syllabi 92, 93, 94
syntactic tokens 80

T
TAC 28
TAEMS task network 55, 68
talk-n-chalk method 139
team leader role 62
technologist role 62
tecnologia agent (TA) 248, 250, 255, 257, 258, 264, 265, 266
terror-excitement 191
textbooks 102, 103
theory of human practical reasoning 176
theory of mind 172, 173, 174, 175, 176, 177, 178, 179, 180, 182, 183, 184, 185, 186
theory-theory 175, 176, 184, 185
Torque Game Builder 138, 140, 141, 147, 152, 153, 154, 155, 157, 160, 161, 162, 163
toy robots 95
Trading Agent Competition 28
Trubshaw, Roy 116
trust 251, 255, 256, 257, 258, 259, 266, 269, 270, 271

U
ubiquitous computing 233, 234, 236, 238, 239, 244, 246
ubiquitous learning (u-Learning) 236
Unity 3D 138, 140, 141, 147, 149, 152, 153, 154, 156, 157, 158, 160, 161, 162, 163, 164
University College Dublin (UCD) 233, 234, vi, 235, xi, 238, 239
University of Essex 116
usability 216, 217, 219, 223, 224, 226
user-machine interaction 190
user modelling 207
user profiles 252, 253, 255

V
virtual characters 172, 173, 184
virtual environments (VE) 140, 141, 142, 145, 146, 147, 149, 150, 153, 154, 157, 159, 161, 169, 206, 207, 224, 232
virtual humans 56
virtual learning environments (VLE) 236, 237
virtual meetings 117
virtual training 172, 173, 174, 184, 186
virtual worlds 117, 119, 120, 123, 124, 129, 131, 136, 137, 141, 146, 165, 208
Vista voice recognition 95
visualizations 3, 7, 26, 31, 46
Voice-over Internet Protocol (VoIP) 142, 143, 144, 148, 149, 151, 155, 158, 160

W
Web 2.0 255
Web 2.0 applications 3
wireless local area network (WLAN) 234, 236, 239
World of Warcraft (WoW) 118
Wundt, Wilhelm 190, 205

Y
YouTube 95