abbreviated speech, in text-based chat, 97
abductive inference, 403
A-Box. See assertional box
academic research domain, 216–217
adaptivity
and ambient learning, 308–309
and CoScribe framework, 314
AHEAD. See Algebraic Hierarchical Equations for Application Design
AI. See artificial intelligence
AJAX. See asynchronous JavaScript
AJAXs. See asynchronous client requests
Algebraic Hierarchical Equations for Application Design (AHEAD), 256
algebraic synthesis (SAS), 297–298, 298
algorithms. See also specific algorithms
classification methods for, 43
windowing techniques of, 20
ALICE. See Artificial Linguistic Internet Computer Entity
ALICE technology, 357
alternative relation, in feature modeling, 236
ambient intelligence (AmI), 305, 309.
See also ubiquitous computing combined with semantic NLP, 311
and SALT Scenario, 312
state of art in, 312–313
and adaptation to knowledge needs, 315–318
adaptation to physical user context, 313–314
collaboration, 318–320
situatedness, 314–315
ambient learning
advantages of, 320
and connectivity, 307–308
defined, 303
example scenario, 311–312, 312
within learning network, 307, 307
requirements for, 304–305
and technology, 305
ambient intelligence, 309
ambient semantic computing, 310, 310–311
natural language processing, 309–310
and traditional knowledge work, 305–306
and trends in computing, 306–307
using ubiquitous computing technology in, 308
ambient semantic computing (ASC) basis for, 310, 310–311
defined, 303
research within, 320
Aml. See ambient intelligence
Amphion, NASA's, 257
ancestor, of ontology, 206–207
ancestor function, 207
annotation matching, SNL, 498–500, 498–503, 502, 503
annotation mechanisms, 159–161
free-form, 161–162
ontology-constrained systems, 160–161
search-based, 162
annotation rules, for ontology evaluation, 402
Anoto-pen, 314
answer processing, in PowerAnswer, 376
AOP. See aspect-oriented programming
application programming interface (API), 209, 245
apposition axioms, 408
The Apprentice, 333
Arapaho, 15
Ariadne, 204
ARIS Process Performance Manager (PPM), 181, 184, 184
artificial intelligence (AI) planning automated, 249
limitations of, 251
specification language for, 277
for Web service composition, 252
artificial intelligence (AI) planning-based synthesis
automated code synthesis system structure, 269, 269–270
automated code synthesis tool suite, 272–273
case study, 273–277, 274, 275, 276
FIP algorithm, 261–268, 264, 265, 268
Graphplan algorithm, 262–263
mapping code patterns to planning domain, 270, 270–272, 271
research in, 277–279
two-phase algorithm in, 263–268, 264, 265, 267, 268
artificial intelligence (AI) techniques in software engineering, 252–257
in Web service compositions, 253
Artificial Linguistic Internet Computer Entity (ALICE) chatbot, 362–363
Asbru, 190
ASC. See ambient semantic computing aspect-oriented programming (AOP), 250
ASR. See automatic speech recognition; automatic speech recognizer assertional box (A-Box), 231
asynchronous client requests (AJAXs), 331
asynchronous JavaScript (AJAX), 342, 343
AT&T
long-distance network crash of 1990, 250
Miracle project of, 326–328, 327, 328
attribute-value matrix (AVM), 490
authority page, defined, 73
author profiling, in text-based chat, 88
automated code synthesis system and deductive code synthesis, 251
importance of, 250
structure, 269, 269–270
automated surveillance, in video data analysis, 448
automatic query rewriting, 224
automatic search, 167, 168–169
dictionary mapping, 169
lexical relationships, 169–170
statistical relationships, 170, 170–171
automatic speech recognition (ASR) detection-based methods for, 51–52
speaker recognition in, 115
automatic speech recognizer (ASR), 50, 51
automatic word recognition, 89
average connected distance, in Web graph, 72
betweenness measure, 83
bigram, 92
biometric authentication, and speaker recognition, 115
BioΨ, 181, 191, 191, 193
bipartite core, defined, 76
bipartite graph complete, 76
directed, 76
hubs and authorities, 77
Blinkx Video Search, 33
blister agent, 401
blobs, in video data analysis, 442
blogs, 347
botmaster, 363
BPEL, 193, 290. See Business Process Execution Language
BPMN. See Business Process Modeling Notation
Brill tagger tool, 499
broader term/narrower term (BT/NT) relations, in KOKO ontology, 429–430
BT/NT. See broader term/narrower term business process, in Web service development, 286
Business Process Execution Language (BPEL), 181, 189–191, 190, 191
Business Process Modeling Notation (BPMN), 185
cable TV (CATV), 326
Cadena, 255
calibration, in speaker recognition, 126
Cambridge Dictionaries Online, 21
Carnot architecture, 205
Carnot system, 222
cascading-style sheets (CSSs), 331
CATV. See cable TV
CBIR. See content-based image retrieval
CBSD. See component-based software development
CBSD, specification language for, 277
CBVIR. See content-based video information retrieval
CBVR. See content-based video retrieval
CCM. See COBRA component model
Channel 4 News at 6PM, 333
Charniak parser F score, 14
Charniak POS tagger, 14
chat, 87, 111. See also text-based chat
features of
chat-specific features, 97, 98
conversation features, 93–96, 94, 95, 96
interactional incoherence in, 98–99 and spoken conversations, 96
chatbot “brain,” 358, 369
chatbots
intuitive, 363–365, 364
knowledge base for, 357
requirements for, 362
chatbots, communities of
creating expert, 358–359
dialogue with, 367–369, 369, 370
interaction between user and, 370
chatbot technologies, 357
chat initialisms (CIs), in text-based chat, 97
chat session, typical, 93, 94
chat specific, in maximum-entropy classification, 102
Cheyenne Mountain Upgrade project, 468
Chinese restaurant process (CRP), 110
CIs. See chat initialisms
Citeseer, 201
class disjointness, in DL-Lite, 233
CLASSIC language, variations of, 135–136
classification schemes, for FinnONTO project, 425–426
classifier performance
and utility of filtering, 336–337
variation in, 334, 334–336, 335, 336
class ontologies, for FinnONTO project, 426
closed-world assumption (CWA), 133
compared with OWA, 148
and UML, 239
cloud computing, 343
cluster merging, in example diarization system, 120
CNS. See Monterrey Center for Nonproliferation Studies
COBRA component model (CCM) based systems, 255
cocitation, defined, 75
code pattern
in CBSD process, 257–261, 259, 260
functional pattern composition operations, 270, 270–272, 271
as planning actions, 270
ReadJoystick, 260, 260–261
replaced with Web services, 278
in tele-control system, 276
code pattern integration system (CPIS), 251
in code synthesis system, 269, 269
experimental evaluations for integration of, 279
code pattern operations, Web application of, 273–275, 274
Cogex
architecture of, 403
backoff strategy of, 411–413
default reasoning with, 413–415, 414
linguistic axioms used by, 407
in QA system, 403
collaboration, and ambient learning, 305
collocation, 20
color feature, in visual semantic extraction, 325
Columbia374 models, 173
COM+. See Component Object Model + Common Object Request Broker Architecture (CORBA), 285
communication, in Web service development, 286
communities, 76
identification of user, 82
online, 354
of practice, 308
spree, 346–353
Web, 343–344
community building, on the Web, 345
component-based software development (CBSD)
in AI planning, 251
automated code synthesis paradigms in, 255
code pattern in, 257–261, 259, 260
Component Object Model + (COM+), 285
Compost, 254
computational learning theory, research in, 135
computer languages, recommended features for, 480. See also specific languages
computer-supported cooperative work (CSCW), and technology, 309
computing, cloud, 343. See also semantic computing
concatenate operation, 258
concatenation graph, 258–259, 259
concept-based search, online resources for, 176
concept classifier models, 325–326
concept detection
flowchart of, 39, 39
online resources for, 176
scores, 168, 168
concept detection and search, context fusion in, 170
concept filtering
and accuracy of concept, 334, 334
data-suggested concepts during, 334, 335, 336
concept filters, interactive user interface, 330, 332
concept model adaptation, 174
concept ontologies, online resources for, 176
concepts
high-level, 325
in visual semantic spaces, 323
concept system architecture, 328
aggregate statistics, 329–330
depth bounding for scalability, 329
conceptual queries, formulating, 174–175
conference management systems, 273
CoNLL 2005, 14
connectivity, networking aspect of, 307–308
content
defined, ix
in maximum-entropy classification, 102
in Web service development, 286
content-based image retrieval (CBIR)
system, 33, 442
content-based video information retrieval (CBVIR), 450
content-based video retrieval (CBVR), 33
background of, 34
characteristics of, 34
potentials for, 45–46
proposed framework for, 36, 37, 37–38
HMMM for video retrieval, 44–45, 45
video concept detection and annotation, 38–44, 39, 43
query results, 38
research directions for, 46
video indexing, 35–36
video retrieval, 36
video syntactic analysis, 35
content modeling techniques, for video data, 440
context-based modeling, 166
context models, Web Ontology Language-based, 313
contexts, 415
components of, 390, 391
for knowledge representation, 389
report, 392, 392–393
temporal, 390–391, 391
types of, 390
contrast model, of semantic similarity measure, 142
conversational agents
ALICE, 365
ALICE chatbots, 362–363
defined, 357
and human-computer interfaces, 362
intuitive reasoning ability for, 358
knowledge representation for, 359–362
conversation features, in text-based chat, 93–96, 94, 95, 96
convolution kernel, notion of, 144
CORBA. See Common Object Request Broker Architecture
coreference, defined, 75–76
core weaving model, 239
CoScribe technology, 314
covering constraints, in OWL-DL, 234
C-OWL work, 223
CPIS. See code pattern integration system
crawling, process of, 70
Crossbrowser, 325
CRP. See Chinese restaurant process
CSCW. See computer-supported cooperative work
CSSs. See cascading-style sheets
cultural heritage domain, application oriented to, 368–369, 369, 370
CultureSampo, 424
CuZero system, 172
CWA. See closed-world assumption
Cyc, 15, 21, 205
DARPA Agent Markup Language (DAML), 467
databases, large-image, 323
database schema integration, 4
data-driven modeling
feature extraction in, 163–164
machine learning, 164
successful approaches, 165
data exchange, 4
data mining (DM), 131
DC. See Dublin Core
DCOM. See Distributed Component Object Model
decision trees
compared with SCM, 43, 43–44
for machine learning approaches to WSD, 379–380
deductive code synthesis, theoretical limitation for, 257
DEMAC Process Description Language (DPDL), 181, 190, 193
DER. See diarization error rate
Descartes language, 255
description logic (DL), 132, 202
description logic (DL) languages, 231, 233
DET. See detection error trade-off
detection-based approach, for computer processing of speech and language, 52
detection error trade-off (DET) curve, in speaker recognition evaluation, 123
detection theory
compared with classification-based approach, 65
fixed-sample-size, 52–55
sequential
application of, 60–64
choosing detection thresholds, 57–58
extension of basic, 58–60
memoryless group data, 59
motivation, 55–56, 65
procedure, 56–57
dialog act labels, for conversational speech, 89, 89–90
dialog act modeling, in text-based chat analysis, 88–90, 89, 90, 91, 92, 93
dialogues, tutorial, 318
diameter, on Web graph, 72
diarization error rate (DER)
components of, 120–121
defined, 120
spatial information incorporated into, 121
dictionary-based mapping approaches, 169
DIG. See DL implementation group
digital satellite system (DSS) receiver, 326
digital TV (DTV) broadcasting, 326
directed path, in Web graph, 72
direct reference, defined, 74
disambiguation, incremental, 380
discourse, in maximum-entropy classification, 102
disjoint features, in feature modeling, 235
Disruptive Technology Office (DTO), 324
distance-based algorithms, 140
semantic similarity measures, 141–145
supervised learning, 145–149, 147
Distributed Component Object Model (DCOM), 285
ditransitive construction, role of verb in, 16
ditransitive patterns, 28
DL. See description logic
DLDB
and enhancements to reasoning, 212–214
extension of, 201
indexing and updates for, 214–215
initial architecture of, 209, 209–212
query API of, 211–212
reasoning in, 212
and Semantic Web, 223
table design of, 209, 209–211
DL implementation group (DIG), 209
DL-Lite, main feature of, 233
Domain, Range, Input and Output (DRIO) model, 255
domain adaptation, in ontology- and concept-based indexing systems, 173–174
domain engineering, 235
domain model
feature models and, 236–239
T-Box definitions defined in, 239
weaving, 238, 238–239
domain-specific applications, 4
DPDL. See DEMAC Process Description Language
DRIO. See Domain, Range, Input and Output
DSS. See digital satellite system
DTO. See Disruptive Technology Office
DTV. See digital TV
DTW. See Dynamic Time Warping
Dublin Core (DC), 423, 424
Dynamic Time Warping (DTW), 452
EAI. See enterprise application integration
eCulture domain, metadata schema in, 424
edge feature, in visual semantic extraction, 326
EER. See equal error rate
e-government domain, 215, 216, 219, 221
80 Million Tiny Images dataset, 158–159, 177
Electronic Program Guide (EPG), for TV programs, 327
electronic visual surveillance technologies, 439
Eliza system, 362
Elsner and Charniak classifier, 105
e-mail, 111
EMiT, 181, 184, 184
emoticon usage, in text-based chat, 97
encoding specificity, 304
Engineering and Physical Sciences Research Council (EPSRC), UK’s, 449
enterprise application integration (EAI), 182
Enterprise Visualization Suite (EVS), 181, 184, 184
Enterprize 2.0, 355
EPC. See Event-Driven Process Chains
EPC Markup Language (EPML), 185
EPSRC. See Engineering and Physical Sciences Research Council
equal error rate (EER), in speaker recognition evaluation, 123
ESP Game, 162
essay grading, automatic, 315–316
EstablishHttpCon, 274
EuroWordNet (EWN), 22
event coreference, 397
Event-Driven Process Chains (EPC), 185
EventNet, 381–383, 383, 415
events, 416
event temporal relations, in question answering, 396, 396–397, 397
EVS, 184, 184. See Enterprise Visualization Suite
exclude relation, in feature modeling, 236
expert chatbots, dialogue with community of, 367–369, 369, 370
experts, human, interaction with, 342
expert search, 354
Experts Exchange, 353
Eptime, 232
eXtended WordNet knowledge base, 415
eXtended WordNet (XWN) project, 380–381
Extensible Markup Language (XML), 181, 237, 342
for Miracle system, 328
ontology based on format of, 218
Extensible Markup Language (XML)-based syntax, 202
Facebook, 343. See also social networks  
face/iris recognition, 439  
factoid questions, 408  
Fast Iterative Planner (FIP), 251–252  
described, 263  
experimental evaluations for integration of, 279  
Fast Iterative Planner (FIP) algorithm in AI planning-based synthesis, 261–268, 264, 265, 268  
performance evaluation for, 279  
feature extraction  
in data-driven modeling, 163–164  
in speaker recognition, 125  
feature-matching model, of semantic similarity measures, 141, 142  
feature modeling, 235–236, 236–239  
feature-oriented programming (FOP), 250  
feedback loop, between humans and technology, 319–320  
“Fetch concept,” of ONKI, 433  
find, in semantic Web service, 293–294  
Finland, National Semantic Web Ontology project in. See FinnONTO  
Finnish Broadcasting Company YLE, 433  
Finnish Collaborative Holistic Ontology KOKO, 427  
Finnish Ontology Library Service ONKI, 431–433  
framework, 421  
vocabularies of, 425–426  
FinnONTO project, 422  
development of, 434  
domain-specific vocabularies of, 425  
KOKO ontologies of, 426–431, 427, 431  
metadata standards for, 424  
pilot applications of, 433–434  
FIP. See fast iterative planner  
first-order logic (FOL), 132  
fixed-sample-size detectors, 52  
Flickr, 161, 343  
Flink system, 81  
FOAF. See friend-of-a-friend data  
FOL. See first-order logic  
folksonomies, 344  
FOP. See feature-oriented programming  
FrameNet, 13, 18, 22  
compared with VerbNet, 24  
uses for, 23  
fraud analysis, 80  
fraud detection, and speaker recognition, 115  
frequency/inverse document frequency (TF-IDF), 350  
friend-of-a-friend (FOAF) data, 81, 218, 222  
functionality constraints, in DL-Lite, 233  
functional pattern composition operations, 270, 270–272, 271  
Gaussian Mixture Model (GMM)  
parameters for, 164  
for speaker recognition and diarization, 116  
GAV. See global-as-view approach  
General Finnish Ontology (YSO), 427, 430–431, 431  
generalization as search, 137  
generalization problem, in ontology mining, 134  
generate-and-test algorithm, 137, 137, 138  
GenVoca, 256  
geometric blur, 163  
GetCookies, 274  
Glare, 190  
GLAV. See global-local-as-view  
GalxyBrowser, 325  
GLIF, 190  
global-as-view (GAV) approach, to resource integration, 205  
global knowledge, reuse of, 311  
global-local-as-view (GLAV) approach, to resource integration, 205  
global quality management, 311  
GMM. See Gaussian Mixture Model  
Google, 69  
PageRank of, 77  
search engines from, 162  
Google Answers, 353  
Google Video Search, 33  
grammar trees  
after SNL annotation matching, 502, 503  
example, 497
graphical user interface (GUI), 5, 238
Graphmaster, 363
Graphplan, 249
  in AI planning-based synthesis, 262–263
  enhancements of, 253–254
graphs
  bipartite, 76, 77
  concatenation, 258–259, 259
  kernel functions for, 144
graph structure models
  multiple-node, 74, 74–76, 75
  single-node, 73–74, 74
  in Web mining, 73
grid layout, interactive user interface, 330, 332
GUI. See graphical user interface
techniques
GUIDE, 190
guided or human-powered Web search, 352–353

Hawkeye cumulative load time, 220, 220
Hawkeye knowledge base, 201
  data sources, 216–218, 217
  load performance, 220, 220
  maps, 218–219, 219, 224
  performance, 219–222
  query performance, 220–222, 221
  scenarios, 215–216
HCI. See human-computer interaction
  hearer, in text-based chat, 96
  heterogeneity, semantic, 202
Hewlett-Packard Business Process Intelligence (HP BPI), 181, 184, 184
hidden Markov model (HMM), 452
hidden Markov model (HMM) taggers, 90
hierarchical LDA (hLDA), 110
hierarchical Markov model mediator (HMMM), for video retrieval, 44–45, 45
hierarchical secrecy, 439
histogram of oriented gradient (HOG), 325
HITS. See hyper-link-induced topic search
hLDA. See hierarchical LDA
HMM. See hidden Markov model
HMM. See hierarchical Markov model mediator
HOG. See histogram of oriented gradient
HP BPI. See Hewlett-Packard Business Process Intelligence
HPSG (head-driven phrase structure grammar), 490
HSV. See hue, saturation, and value
HTML. See Hypertext Markup Language
hub page, defined, 73
hubs and authorities, in Web search, 77
hue, saturation, and value (HSV) color histogram, 446–447, 448
human activity detection, 439
human-computer interaction (HCI), 308.
  See also Conversational agents research in, 357
  in video data analysis, 449
human speech recognition, classification-based approach to, 51. See also speech recognition
human thinking, characteristics of, 358
hyper-link-induced topic search (HITS), randomized, 77–78
hyper-link-induced topic search (HITS) algorithm, 73, 77, 77–78, 80
Hypertext Markup Language (HTML), 202
hypothesis testing theory, 52–54

IBM
  CLEVER project at, 78
  “Pass It Along” project of, 353
IC. See information content
ICSI. See International Computer Science Institute
ICT. See information and communication technology
IDL. See Interface Description Language
ILP. See inductive logic programming
IM. See instant messaging
image processing, and issue of scale, 172–173
image retrieval, relevance feedback in, 46
images. See also video content; visual concepts
automated indexing of, 155
interactive user interface, 330, 332
indegree, defined, 71
indexes, in query performance, 214–215
indexing, 323
semantic, 324
video data, 35
indirect reference, defined, 74–75
inductive learning, LCS operator for, 136
inductive logic programming (ILP), 132
Infomaster, 204
information, economic benefits of access to, 354–355
information and communication technology (ICT), and learning, 308
information content (IC), 142
information retrieval (IR), 33
defined, 87
for text-based chat, 87
via vector space model, 103–105
information state theory, of dialogue modeling, 317
information technology, QA systems in, 373. See also question answering
instance checking, 134
instance equalities, 213
instance ontologies, for FinnONTO project, 426
instant messaging (IM), 111, 347
dialog act classifications for, 93
dialog act tagging using, 90
integration, problems of, 241
interational incoherence theory, 98–99
interactive search, 167, 171–172
interactive systems, 331
interannotator agreement, 17, 102, 319
Interface Description Language (IDL), 255
International Computer Science Institute (ICSI), speaker diarization engine of, 119–120
Internet, democratic nature of, 345.
See also the Web
Internet of Service (IoS), 279
Internet protocol (IP) addresses, 70
Internet Relay Chat (IRC),
disentangling conversations in, 100
interschema correspondence assertion (ISCA), 205–206
interval-based representation, 395
intuition, modeling human, 369
intuitive-associative capability, obtaining, 358
intuitive chatbots, 363–365, 364
intuitive matching
ALICE-based, 366, 366
vs. pattern matching, 365–367, 366
invert operation, 260
invoke/bind, in semantic Web service, 294
IoS. See Internet of Service
IP. See Internet protocol
IR. See information retrieval
IRC. See Internet Relay Chat
ISA. See service share, mutual fund unit
ISA, in DL-Lite, 233
Jaguar
classification step for, 399
filtering mechanism of, 398
hierarchies in, 400–401, 401
knowledge base for, 399
ontologies built by, 398
text processing of, 398–399
Java business process management
(jBPM) Process Definition Language (JPDL), 181
components of, 187, 188
example process, 187, 188, 189
Java database connection (JDBC) driver, 209
JavaScript, 69
joystick actions, 264. See also Readjoystick
JPDL, 193. See Java business process management Process Definition Language; jBPM Process Definition Language
Jyve, 353
kernel functions, for DL representation, 144–145
kernel methods, of supervised learning, 147, 147–148
keyframe, defined, 446
keyword spotting, 51
KIDS, Kestrel Institute’s, 257
KIF. See Knowledge Interchange Format
K nearest neighbor (KNN), 44
knowledge
contextual, 389
universal, 389
knowledge generation, on the Web
community building, 345
open innovation principle, 345
peer-to-peer networking, 342–343
privacy issues, 345
 Web 2.0, 344
 Web communities, 343–344
Knowledge Interchange Format (KIF), 204
knowledge modeling, link analysis for, 80–81
knowledge needs, 307
adaptation to, 304
 assessment of content, 315–316
 user feedback, 316–317
 user interaction, 317
better understanding of, 311
knowledge representation
conceptual interpretation, 360–362
data-driven semantic spaces, 359–360
semantic manifolds, 359–362
knowledge work, 303
collaborative, 320
traditional scenarios for, 306–306
use of technology in, 306
Kodak’s consumer video benchmark dataset, 158
KOKO. See Finnish Collaborative Holistic Ontology
KOKO ontologies
guidelines for, 428
transforming traditional thesauri in, 429–430
LabelMe, MIT, 161–162
languages. See also web ontology language; specific languages
content description, 467
detection-based approach for computer processing of, 52
metalanguages, 241
ontology, 232, 239
programming, 478, 479
turn allocation techniques in spoken, 94–95, 95
large-dataset learning, 166–167
Large-scale Concept Ontology for Multimedia (LSCOM), 176
concepts, 165
development of, 157
lite concepts, 173
and MediaMill sets, 158
Large-Scale Concept Ontology for Multimedia (LSCOM) workshop, 324
large-scale learning, 175
latent Dirichlet allocation (LDA), 106–110, 107–110
latent semantic analysis (LSA), 351 explained, 359
methodology of, 357
 LAV. See local-as-view approach
LCS. See least common subsumer
LDA. See latent Dirichlet allocation
LDOCE. See Longman Dictionary of Contemporary English
learning, 303. See also ambient learning;
knowledge work
collaborative, 303–304
large-dataset, 166–167
large-scale, 175
machine, 131, 325
real-situated, 314
situated, 304
use of technology in, 306
learning networks, 307–308
Learning Object Metadata (LOM), IEEE, 424
least common subsumer (LCS), 135, 142
lexical chains, 415
argument propagation across, 385
in axiom generation, 406
defined, 383
for QA system, 382
quality of, 383–384
lexical mapping, 27
lexical relationships, in automatic search, 169–170
lexicon
  bilingual, 14
  collocations in, 20
license plate recognition, 439
linguistic axioms, 407–408
linguistics, cognitive, 17
link, defined, 71
link analysis
  applications of
    community extraction, 82, 82–83
    criminal network analysis, 81–82
    fraud analysis, 80
    knowledge modeling, 80–81
    organizational theory, 83
    semantic web and social networks, 81, 81
  Web page ranking, 80
  integration of Web 2.0 with, 71
  knowledge models in
    graph structure models, 73–76, 74, 75
    Markov models, 76
  measures and algorithms, 76
  HITS algorithm, 77, 77–78
  PageRank, 78, 78–79
  research in, 72–73
  techniques, 69
  in Web mining, 70
LinkedIn, 343
local-as-view (LAV) approach, to
  resource integration, 205
log-likelihood-ratio cost function, in
  speaker recognition evaluation, 124
LOM. See Learning Object Metadata
Longman Dictionary of Contemporary
  English (LDOCE), 21
LSCOM. See large-scale concept
  ontology for multimedia
LUNAR, 490
Lycos iQ, 353
Lymba Corporation, 374, 381
machine-assisted annotation, 161
machine learning (ML), 131
machine learning techniques, 325
machine translation (MT), statistical, 15
mandatory relation, in feature modeling, 235–236
MAP. See maximum a posteriori
mapping
  population, 131
  query-to-concept, 172
Markov model mediator (MMM)
  mechanisms, 44
Markov models, 76
  hidden Markov model (HMM), 452
  taggers, 90
  hierarchical Markov model mediator
    (HMMM), 44–45, 45
MARVEL video retrieval system, 36
maximum a posteriori (MAP) decision
  rule, 50
maximum-entropy (ME), for machine
  learning approaches to WSD, 379–380
maximum-entropy (ME) classification,
  evaluation of, 102, 103
MBP. See model-based planner
MC. See multiple choice
MCS. See most common subsumer
MDA. See Model Driven Architecture
MDSD. See model-driven software
  development
ME. See maximum-entropy
MediaMill, 176
MediaMill Challenge dataset, 157–158
MediaMill semantic search engine, 325
MediaMill video search engine, 171
MediaNet, conceptual representations
  on, 455
medoids, concept of, 143
Meet the Press, 333
mel frequency cepstral coefficients
  (MFCCs), 116
mentions
  in chat session extract, 98
  in text-based chat, 97
metadata schemas, developing, 423–424
Metafor, 481
metalanguages, 241
metamodel overlap scenario, 242
metamodels, 230
  with composition operators, 243
  and problems of integration, 241
Meta Object Facility (MOF), 230, 241
MFCCs. See mel frequency cepstral
  coefficients
Mikrokosmos, 15
minimum $C_{det}$, in speaker recognition evaluation, 123
MiPad system, 52, 62
detection-based, 64
two versions of, 63
Miracle system, 324, 326
architecture of, 327
concept classifier models used by, 327–328
concept processing framework of, 329
interactive user interface, 330, 331–333
scoring filtered results, 331
search engine, 327
suggested scenario for, 330, 330–331
user query in, 327, 328
XML files used by, 328–329
MIT LabelMe system, 161–162
MLMF. See multilabel multifeature learning
MMDBSS. See multimedia database systems
MMM. See Markov model mediator
model-based planner (MBP), 254
Model-Driven Architecture (MDA), 255–256
in code synthesis techniques, 250
ontology-aware, 240
process, 240
model-driven software development (MDSD), 229
applying ontology technology in, 245
metamodeling foundations, 230
ontology foundations, 231–232
ontology technologies in integration of semantics of modeling techniques, 239–244, 240, 243
validation and verification of models, 235–239
OWL-based modeling with UML-based modeling, 232, 232–235, 233
proposed architecture for, 244, 244–245
modeling, 229. See also Markov models; software modeling; specific models
class-based, 230–231
integration technology for, 242–244, 243
UML class-based, 229
modularity measure, 83
MOF. See Meta Object Facility
Monterrey Center for Nonproliferation Studies (CNS), 401
most common subsumer (MCS), 135
motion-based recognition, in video data analysis, 448
Motion Picture Experts Group 4 (MPEG-4), 327
Motion Picture Experts Group (MPEG) video, 450
Moving Pictures Experts Group (MPEG), 3, 191, 192, 467
MPEG. See Moving Pictures Experts Group
MSR, Speech Technology Group of, 63
MT. See machine translation
multilabel multifeature (MLMF) learning, 325
multimedia
automatic indexing of, 155
large-scale concept ontology for, 176
semantic modeling of, 442–443
multimedia database systems (MMDBSS), 4, 34
multimedia search, early approaches to, 155
multimedia security applications
semantic analysis of, 439–442
feature-based modeling, 447–449
high-level semantic modeling, 449–457
segmentation, 442–443
shot boundary/scene change detection, 443–446
video summarization, 446–447
multimodal natural language interface, 5
multiple choice (MC), automatic generation of, 316
multiple-node models, on Web graph, 74, 74–76, 75
multiple-object-based event recognition, 453
multiplicity constraints, in OWL-DL, 234
multirelational learning, 132
mutual reference, defined, 75
MySpace, 343. See also social networks
named entity recognizer, in PowerAnswer, 377
National Institute of Standards and Technology (NIST), TRECVID video retrieval benchmark of, 160
natural language
  in SNL annotation matching, 499 structured, 492–494
natural language axioms
  linguistic axioms, 407–408
  ontological axioms, 406
  semantic calculus axioms, 408–410
  temporal axioms, 410
  XWN-KB axioms, 405–406
natural language-based requirements engineering, 485
natural language description, of problem, 479
natural language generation, 316
natural language interface, 5
natural language processing (NLP), 13–15, 305, 374
  in analysis of text-based chat
  author profiling, 88
dialog act modeling, 88–90, 89
  natural language-based requirements engineering, 485
object model requirements, in object relational software development process, 474. See also requirements engineering
object relational algebra (ORA), 489, 490, 491–492
object relational data model components of, 473
  consistency of, 474
object relational software, development process for, 473
object relational software engineering, 472–473
  consistency analysis for, 474
data model requirements in, 474–475
  example of, 474–478, 476
query requirements in, 475
requirements categorization for, 473, 475–478, 476
specification transformation, 473–474
ODM. See ontology definition metamodel
OLAP. See online analytical processing
OMDA. See ontology-aware MDA
Omega, 15
Omega ontology, 21
ONKI. See Finnish Ontology Library
Service ONKI
online analytical processing (OLAP), 6
online communities, social aspect of, 354
online social search, 355. See also social
networks
ontology, 131, 416
ancestor of, 206–207
automatic generation of, 398–402
axioms, 406–407, 407
class definition language for, 229
as data definition mechanism, 202–203
defined, 398, 467
establishing alignment for, 203
global ontology system, 434–435
perspectives, 206–208
as ready-to-use, 421
of visual concepts, 156
ontology adaptation, 174
ontology-aware MDA (OMDA),
240–241
ontology-aware model chains, 240
ontology-aware software development,
240
ontology building, semiautomation of,
131
ontology definition metamodel (ODM),
242
ontology integration, 4
Ontology Interchange Language (OIL),
467
ontology languages, 232, 239
ontology mapping, 4
ontology mining, 131–132
with distance-based algorithms, 140
semantic similarity measures,
141–145
supervised learning, 145–149, 147
representation and reasoning,
132–134
with structural learning algorithms,
135–140, 136, 137
ontology modeling, 231
ontology perspective entailment, 208
ontology perspective model, 207–208
OntoNotes, 18
Open Directory Project, 72
open innovation principle, 345–346
open-world assumption (OWA), 133
and assumption of falsity, 239
theoretical problem posed by, 148
optional relation, in feature modeling,
236
organizational theory, and social
networks, 83
or relation, in feature modeling, 236
outdegree, defined, 71
overfitting concepts, phenomenon of,
136
OWA. See open-world assumption
OWL. See Web Ontology Language
OWL abstract syntax, 233
OWL file, for DLDB, 209
OWL-S. See Semantic Web Ontology
Language
OWL-Xplan, 252
Oxford English Dictionary, 21
PageRank, 80
algorithm, 78, 78–79
Google’s, 77
query-dependent, 73
topic-sensitive, 72
parses, ambiguous, 19
participation constraints, in DL-Lite,
233–234
part-of-speech (POS) tagging,
classification labels for, 90, 91
passage retrieval, in PowerAnswer, 376
path distance measures, 141
pattern matching
ALICE-based, 366, 366
for conversational agents, 357
vs. intuitive matching, 365–367, 366
PDF. See probability density function
peer-to-peer (P2P) networking, 341,
342–343
Penn Treebank Tag-Set, 495
people search engines, 353
perceptual linear prediction (PLP), 116
Personalized Information Description
Language (PIDL), 467
Petri Net Markup Language (PNML),
185
petri-net models, 453
PHP. See server-side scripting

PIDL. See Personalized Information Description Language

PIMs. See platform-independent models

Pipl, 353

Place/Transition Net, 185

platform-independent models (PIMs), 250

platform-specific models (PSMs), 240

PLP. See perceptual linear prediction

pLSI. See probabilistic latent semantic indexing

PNML. See Petri Net Markup Language

population mapping, semiautomation of, 131

POS. See part-of-speech

PowerAnswer, 373

and architecture of, 376–379, 377, 378

semantic information in, 415

P2P. See peer-to-peer

PPM. See ARIS Process Performance Manager

PRECISE system, 490

privacy issues, on the Web, 345

probabilistic latent semantic indexing (pLSI), 105–106

probability density function (PDF)

GMM representation of, 116

in hypothesis testing theory, 52–53

procedure models, 245

process annotation language, 191–193, 192, 193, 194–195

generic, 192

object-oriented, 193

process description languages

Business Process Execution Language, 189–191, 190, 191

jBPM Process Definition Language, 187, 188, 189


XML Process Definition Language, 185–186, 186

process log

example, 182, 182

information contained in, 183

process model corresponding to, 182, 183

Process Miner, 181, 184, 184

process mining

applications for, 184, 184

features of, 183

interactions with WFM, 184, 184

methods, 181

principle of, 182–183

research in, 182

process-modeling languages, 185


product reviews, user-generated, 354

PROforma software, 181, 190–191, 193

programming. See semantic programming

programming languages, 478, 479

and exponential variables, 481–482

semantic, 485

PROLOG, 478

ProM, 185

PROMPT Suite, 430

PropBank, 13

annotation, 25

applications of, 26

empty categories in, 25

and lexical mapping, 27

provisions of, 24–25

role sets of, 25

propositionalization, dissimilarity measure based on, 144

Protége project, 430

PSL, 193. See Process Specification Language

PSMs. See platform-specific models

publishing operation, in semantic Web service, 293

QA process

semantic contributions to, 378

semantic data in, 415

QA systems

basic structure of, 374, 374

classification of, 373

and lexical chains, 382–385

ontologies for, 398

automatic ontology generation, 398–402

evaluation of, 402

state-of-the-art, 376–379, 377, 378

QBE. See query by example

QBK. See query by keyword
quality of services (QoS), 2
query answering of DLDB, 211–212
semiautomation of, 131
query by example (QBE), 34, 449
query by keyword (QBK) paradigm, 449–450
query requirements, in object relational software development process, 474
query-to-concept mapping system, designing, 172
question answering (QA), 373. See also QA systems
and architecture of PowerAnswer, 376–379, 377, 378
and extended WordNet knowledge base, 380–382, 381
and knowledge representation of text, 374, 375, 376
semantic reasoner for, 402–403
logical form representation, 404–405
natural language axioms, 405–415, 414
reasoning with natural language, 410–415, 414
semantics in, 379
and word sense disambiguation, 378–380
question processing, in PowerAnswer, 376
random surfer model, PageRank algorithm based on, 79
RDBMS. See Relational Database Management System
RDF. See Resource Definition Framework
RDF(S). See Resource Description Framework Scheme
ReadJoystick, 264, 269
code pattern for, 260, 260–261
nondeterministic action of, 276
realization problem, in ontology mining, 134
Really Simple Syndication (RSS) feed, 347
reference resolution system, in PowerAnswer, 377
refinement operators
definition of, 137
learning in DLs with, 136, 136–140, 137
refinement problem, in ontology mining, 134
Relational Database Management System (RDBMS), Structured Query Language-compliant, 209
relevance feedback
in image retrieval, 46
and interactive user interface, 333
Remote Method Invocation (RMI), Java, 285
REQUEST. See Restricted English Question-answering request-response model, on the Web, 342–343
requirements engineering
natural language and, 468–471
object-oriented structured analysis, 470–471
operational specifications, 470
structured analysis, 470
requirements specifications creation of, 473–474
difficulties with, 468–469
informal methods, 470, 471
require relation, in feature modeling, 236
ResearchCyc, 21
resegmentation, in example diarization system, 120
Resource Definition Framework (RDF), for DLDB, 209
Resource Description Framework (RDF), 81, 422, 467
Resource Description Framework (Scheme) (RDF(S)), 421, 467
Restricted English Question-answering (REQUEST) system, 362
retraining, in example diarization system, 120
RetrieveInfo, 274
Rich Web, 342
RMI. See Remote Method Invocation robot simulation system, 260, 260–261
role typing, in DL-Lite, 233
RotorBrowser, 325
rule requirements, in object relational software development process, 474
SAD. See speech activity detection
SALT. See semantic ambient learning tool
same As Relations, 219, 219
SAS. See algebraic synthesis
SAS process, and SCDL, 297
SC. See semantic computing
scalability, in concept system architecture, 329
scale, issue of, 172–173
scale-invariant feature transform (SIFT)
descriptors, 163, 165
SCDL. See Semantic Capability Description Language
schema-based synthesis, 256
schemas, as data definition mechanisms, 202–203
schism by aide, 96
schism by schism-inducing turn, 95
schism by toss-out, 95
SCM. See subspace-based concept mining
score generation, for speaker recognition, 126
search, content-based, 323
search engines
people, 353
semantic, 352
search experiments, in visual semantics
classifier performance, 334, 334–336, 335, 336
data subset for, 333
execution profile, 337
utility of filtering, 336–337
search interface, goals for, 332
search space
of adjective phrases, 500
construction of, 505
for matching natural language queries, 504
of noun phrases, 500
in SNL annotation matching, 499, 499–500
of verb phrases, 499
security. See also multimedia security applications
infrastructure, 456, 457
need for, 1
security semantics, 439. See also multimedia security applications
segmentation, in video data analysis, 442–443
semantic ambient learning tool (SALT), 311–312, 312
semantic analysis, 1
defined, 2
high-level semantic modeling, 449
intelligence-based systems, 454–455
multimodal probabilistic frameworks, 453–454
and querying of video data, 455–457
motion-based, 457
for multimedia security applications, 439–442
feature-based modeling, 447–449
high-level semantic modeling, 449–457
segmentation in, 442–443
shot boundary/scene change detection, 443–446
video summarization in, 446–447
output of, 3
process of, 3
research in, 3
semantic calculus axioms, 408–410
Semantic Capability Description Language (SCDL), 294, 294–295
composition of Web services by algebraic synthesis, 297–298, 298 preliminaries, 295–297
semantic classifications, automatic induction of, 29
semantic computing (SC)
architecture of, 2
connections between content and intentions, 1–2, 2
definitions of, 1, ix
as integrated discipline, 7
research in, 49
technical coverage of, 7
semantic conflict resolution, 4
semantic filter, 338
semantic gap, for video retrieval, 46
semantic indexing, 324
Semantic Information Retrieval (SIR), 362
semantic integration, 1
  approaches to, 201, 205
  defined, 2
  existing work on, 3–4
  framework for, 206–208
  research in, 204
semantic interface, 1, 2, 2, 5
Semantic Interpretation for Speech
  Recognition (SISR), 49
semantic manifold, 359
SemanticObjects, 491, 492
  adjective and verb method
    information provided by, 498
  adjective method chosen, 501
  SNL-related meta-information stored
    by, 498
SemanticObjects project, 489
semantic parser, in PowerAnswer, 377
semantic programming, 6, 478–485
  framework for, 485, 486
  languages, 485
semantic reasoner
  logical form representation, 404–405
  for question answering, 402–403,
    404–405
  natural language axioms, 405–415,
    407, 414
  reasoning with natural language,
    410–415, 414
semantic relations, 415
  classification of, 388
  defined, 385
  extracted by Polaris, 386–387, 388
  identification of, 387–388
  Lymba’s set of, 385, 386–387
  signatures generated by, 389
semantic role, 18, ix
semantic role labeling (SRL) systems, 14
semantics
  in question answering, 379
  word sense disambiguation, 378–380
semantic search engines, 352
semantic services, 1
  defined, 2
  forms of, 4
semantic similarity measures, 141
  based on information content, 142
  for DL representation, 142–144
  kernel functions for DL
    representation, 144–145
semantic software engineering
  natural language and requirements
    engineering, 468–471
  object relational software, 471–472
  object relational software engineering,
    472–474, 473
semantic Web (SW), 81, 131, 291–292, 421
  applications for, 132
  cross-domain content infrastructure,
    422–423
data storage of, 203
DLDB, 223
  and FinnONTO, 434
heterogeneity problems of, 203
metadata schemas for, 423–424
model of, 206–208
mutually aligned cross-domain
  ontologies, 425–426
ontologies used by, 202
query-answering system of, 209–215
reasoning with, 222
Semantic Web Ontology Language
  (OWL-S), 294, 294–295. See also
  Web Ontology Language
semantic Web service
  defined, 292
  framework for, 292–294, 293
  implementation of framework, 294,
    294–295
SemLink
  functions of, 26
  project, 24
  VerbNet/FrameNet mapping, 27
SemVideo, 456
sense distinctions, and role of verbs,
  16–18
sense divisions, interpretation of,
  28
Sensory Graphplan (SGP), 253
sequential detection
  application of
    case study, 60–61
    detection-based decoding, 61
    experimental results with,
      63–64
    SLU system in, 62, 62–63
    timeout mechanism in, 61–62
  mathematical foundations of, 65
  practical motivation of, 65
technique, 60
sequential probability ratio test (SPRT) decision statistic, 58
Wald’s, 56–57
server-side scripting (PHP), 331
service integration, 1, 2, 4–5
Service-Oriented Architecture (SOA), 279
service share, mutual fund unit (ISA), 400
set of support (SOS) strategy, 411
SGP. See Sensory Graphplan
SHOP2. See simple hierarchical ordered planner
shortest path, in Web graph, 72
shot, in video data analysis, 443
SIFT. See scale-invariant feature transform descriptors
signal-to-noise ratio, in detection theory, 55–56
simple hierarchical ordered planner (SHOP2), 253, 254
Simple Knowledge Organization System (SKOS), 422
simple object access protocol (SOAP), 253
single-node models, on Web graph, 73, 74
SIR. See Semantic Information Retrieval
SISR. See Semantic Interpretation for Speech Recognition
situatedness of ambient learning, 304, 314–315
implementing, 311
SKOS. See Simple Knowledge Organization System
SLU. See spoken language understanding
SMIL. See synchronized multimedia integration language
SNA. See social network analysis
SNL. See structured natural language
SNL-DIRECT system, 494, 495, 503–504
SNL queries, 493
SOA. See Service-Oriented Architecture
SOAP. See simple object access protocol
social media monitoring, 355
sites, 161
social network analysis (SNA) betweenness measure in, 83
criminal network applications of, 81–82
social networks, 81, 306, 348
communities in, 82
integration of data sources for, 81
social search, 354
online, 355
spree system, 346–353
use-case, 346
social search platform, development of, 341
social software, 303. See also Web 2.0
software development. See also model-driven software development and code synthesis techniques, 249
open, 345
writing software, 478
software engineering application of AI techniques to, 252–257
semantic, 468–478
software modeling, semantics of, 229–230
software product lines (SPLs) ontology-enriched variability management for, 237–238
variability management in, 236
software requirements, 468. See also requirement specifications
SOS. See set of support strategy
SPARQL Query Language for RDF, 422
SPARTACUS, 255
spatial structure histogram (SSH), 446
speaker, in text-based chat, 96
speaker diarization applications for, 115, 117–118
approaches to, 118–119
evaluation measures for, 120–121
example diarization system, 119–120
goal of, 117, 118
limitations of, 127
research in, 121–122
speaker recognition contrasted with, 118
tasks of, 118
trend in, 122
two-stage approaches, 119
speech recognition, 122. See also speech recognition
applications for, 115, 122
evaluation measures, 123–124
limitations of, 127
model generation for, 125–127
research focus in, 127
score generation for, 126
speaker diarization contrasted with, 122
system architecture for, 124, 124–127
training data for, 127
speaker recognition and diarization
Gaussian Mixture Model for, 116
speech activity detection, 117
and speech features, 116
universal background model for, 117
speech
detection-based approach for computer processing of, 52
dialog act labels in conversational, 89, 89–90
speech activity detection (SAD), and speaker recognition, 117, 125
speech recognition
automatic (ASR)
detection-based methods for, 51–52
speaker recognition in, 115
technology, 49–50
detection-based mechanism for, 51–52
research in, 49
speech recognizers
automatic (ASR), 50, 51
computer-based, 49
speech segment, processing steps for, 125
Spherebrowser, 325
SPICELIB, 257
splice operation, 260, 260–261
SPLs. See software product lines
spoken language understanding (SLU)
system, 50
problems with, 51
in sequential detection, 63
SpreadWeights algorithm, 384
spree community, 346–353
spree system, 355
communication structure of, 349
features of, 346–353
and related systems, 352–353
taxonomy construction for, 349–351, 350
technology and implementation, 348, 349
usability evaluation of, 351–352
user-centered design process in, 351, 351
user interface for, 347
SPRT. See sequential probability ratio test
SQL. See Structured Query Language
SQL 99 standard, 471–472
SRL. See semantic role labeling
SSH. See spatial structure histogram
Stanford Research Institute Problem Solver (STRIPS) operators, 253
statistical relationships, in automatic search, 170, 170–171
statistics, aggregate, in concept system architecture, 329–330
strings, kernel functions for, 144
STRIPS. See Stanford Research Institute Problem Solver
structural learning algorithms
learning in DLs with refinement operators, 136, 136–140, 137
least common subsumers, 135–136
structured natural language (SNL), 489, 490, 492–494
annotation matching, 498–500, 498–503, 502, 503, 503
interactive composition of queries in, 494
translation from natural language to grammar parser, 496, 497, 498
morphological analysis, 495–496
syntax restrictions, 495
system architecture, 494–495
Structured Query Language (SQL), 209, 296
subspace-based concept mining (SCM), 38–39
Suggested Upper Merged Ontology (SUMO), 15, 21
supervector generation, in speaker recognition, 125
supervised learning, 145–146
kernel methods, 147, 147–148
nearest-neighborhood approach and kernel method, 148
nearest-neighborhood search approach, 146–147
Support Vector Machine (SVM), 36, 116, 164, 165, 325
compared with SCM, 43, 43–44
for machine learning approaches to WSD, 379–380
and supervised learning, 148
surveillance. See also security
automated, in video data analysis, 448
of infrastructure, 439
low-level, vision-based, 455
SW. See semantic Web
Swoogle’s 2006 index, 219, 222
SWORD, 253
synchronized multimedia integration language (SMIL), 456–457
syntactic disambiguation, 316
syntactic parsing
in PowerAnswer, 377
and user feedback, 316
syntactic patterns, of verbs, 20
syntactic preferences, 20
syntax, role of verbs in, 15

table design, of DLDB, 209, 209–211
TAP, and Semantic Web, 223
T-Box. See terminological box
TDOA. See time delay of arrival
technology
and computer-supported cooperative work, 309
feedback loop between humans and, 319–320

tele-control system
code patterns used in, 275, 275–277, 276
loop construct for, 268, 268
robot simulation in, 260, 260–261
temporal concept tagger, performance of, 394
temporal expressions, 415–416
categories for, 393
event extraction for, 395
identifying and normalizing, 393–395, 394
representing, 395
temporal relations
event, 396, 396–397, 397
identification of, 396
term frequency-inverse document frequency (TF-IDF), 104
terminological box (T-Box), 231
text-based chat, 87, 90. See also chat
text-based search, over multimedia collections, 155
text classification, 105
hierarchical latent dirichlet allocation, 110–111
latent dirichlet allocation, 106–110, 107–110
probabilistic latent semantic indexing, 105–106
textual devices, in text-based chat, 97
texture feature, in visual semantic extraction, 326
TF-IDF. See term frequency-inverse document frequency
TF/IDF. See frequency/inverse document frequency
themetic roles, 18
thesauri, traditional, for FinnONTO project, 425
thinking, human, characteristics of, 358
thread extraction
conversational, 98
example, 100–101, 101
maximum-entropy classification in, 101–102
persistence aspect in, 99–100
on text-based chat, 87
and turn-taking system, 100
time delay of arrival (TDOA), in
speaker diarization, 121
Timed Petri Net (TPN), 185
TLPlan, 254
T-normalization, in speaker recognition, 126
The Tonight Show with Jay Leno, 333
topic detection, in text-based chat, 87
topic drift, problem of, 78
TPN. See Timed Petri Net
traffic monitoring
semantic analysis for, 439
in video data analysis, 449
transitive closure, 214
TRECVID, 324
TRECVID2005, high-level feature (concept) set, 325
TRECVID annotation forum, 160, 161, 165, 177
trees, kernel functions for, 144. See also decision trees; grammar trees
TrindiKit, 317
truncated singular-value decomposition (TSVD) technique, 359, 361
TSIMMIS, 204
TSVD. See truncated singular-value decomposition
turn allocation techniques, in spoken language, 94–95, 95
turn-taking systems, and conversations, 96, 96
tutoring systems, 318	
two-phase algorithm, in AI planning-based synthesis, 263–268, 264, 265, 267, 268
TwoUse, 241

ubiquitous computing, 309. See also ambient intelligence
concept of, 306
goals of, 308
UBM. See universal background model
UBM index generation, in speaker recognition, 125
ULAN. See Union List of Artist Names
UML. See Unified Modeling Language
Unified Modeling Language (UML), 467
advantages and disadvantages of, 229
class diagrams, 230, 476, 476
compared with OWL, 239
Unified Modeling Language (UML) class-based modeling
and automated reasoning, 234
OWL and, 232, 232–235, 233
uniform resource identifier (URI), and table design, 210
uniform resource locator (URL) and interactive user interface, 333
references, 70
Union List of Artist Names (ULAN), 426, 432
universal background model (UBM), for speaker recognition, 117
URI. See uniform resource identifier
URL. See uniform resource locator
user-customized searches, 333
user feedback, adaptation to, 316–317
user-generated product reviews, 354
user interface, in CBVR, 34
user-to-user support forum, 354

variability management, ontology-enriched, 237–238
VDBMs, 455. See Video Database Management Systems
vector space model, information retrieval via, 103–105
vehicle navigation, in video data analysis, 449
VEML. See video event markup language
VerbNet, 13, 20, 22
compared with FrameNet, 24
and lexical mapping, 27
provisions of, 23–24
uses for, 24
verbs “arguments” of, 13
class membership and semantic neighbors for, 21
collaborations, 20–21
definition and sense distinctions of, 16–18
eexisting resources for dictionaries, 21–22
FrameNet, 23
OntoNotes, 26
PropBank, 24–26
SemLink, 26–27
VerbNet, 23–24
WordNet, 22–23
key role of, 15–16
problems with, 28
selectional preferences for semantic roles of, 18–19
syntactic preferences, 20
VERL. See video event retrieval language
version space representation, 136, 136
VHSIC hardware description language (VHDL), 467
<table>
<thead>
<tr>
<th>Video concept detection and annotation</th>
<th>37, 38–39, 39</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decision fusion</td>
<td>42–43</td>
</tr>
<tr>
<td>Empirical analysis</td>
<td>43</td>
</tr>
<tr>
<td>Feature selection</td>
<td>40–41</td>
</tr>
<tr>
<td>Parameter self-refinement</td>
<td>41–42</td>
</tr>
<tr>
<td>Robust correlation matrix</td>
<td>39–40</td>
</tr>
<tr>
<td>Subspace-based classification</td>
<td>42</td>
</tr>
<tr>
<td>Training data self-refinement</td>
<td>40</td>
</tr>
<tr>
<td>Video content</td>
<td></td>
</tr>
<tr>
<td>Feature-based modeling of</td>
<td></td>
</tr>
<tr>
<td>Spatial image features</td>
<td>447–448</td>
</tr>
<tr>
<td>Temporal motion features</td>
<td>448–449</td>
</tr>
<tr>
<td>High-level semantic modeling of</td>
<td>449–453</td>
</tr>
<tr>
<td>With intelligence-based systems</td>
<td>454–455</td>
</tr>
<tr>
<td>Multimodal probabilistic frameworks</td>
<td>453–454</td>
</tr>
<tr>
<td>And querying of video data</td>
<td>455–457</td>
</tr>
<tr>
<td>Video copy detection</td>
<td>324</td>
</tr>
<tr>
<td>Video data</td>
<td></td>
</tr>
<tr>
<td>Generic semantic analysis architecture for</td>
<td>441, 441–442</td>
</tr>
<tr>
<td>Multilevel architecture for</td>
<td>456</td>
</tr>
<tr>
<td>Semantic abstraction of</td>
<td>440, 440</td>
</tr>
<tr>
<td>Shot boundary/scene change detection</td>
<td>443–446</td>
</tr>
<tr>
<td>Video Database Management Systems (VDBMSs)</td>
<td>450, 455</td>
</tr>
<tr>
<td>Video event markup language (VEML)</td>
<td>159</td>
</tr>
<tr>
<td>Video event retrieval language (VERL)</td>
<td>159</td>
</tr>
<tr>
<td>Video indexing</td>
<td></td>
</tr>
<tr>
<td>In CBVR</td>
<td>35–36</td>
</tr>
<tr>
<td>In video data analysis</td>
<td>448</td>
</tr>
<tr>
<td>VideoQ system</td>
<td>451</td>
</tr>
<tr>
<td>Video retrieval</td>
<td></td>
</tr>
<tr>
<td>In CBVR</td>
<td>36</td>
</tr>
<tr>
<td>Content-based</td>
<td>33</td>
</tr>
<tr>
<td>HMMM for</td>
<td>44–45, 45</td>
</tr>
<tr>
<td>Researches in</td>
<td>33</td>
</tr>
<tr>
<td>Videos, automated indexing of</td>
<td>155</td>
</tr>
<tr>
<td>Video search</td>
<td>324</td>
</tr>
<tr>
<td>Video search engines</td>
<td>33</td>
</tr>
<tr>
<td>With visual semantic concepts</td>
<td>337–338</td>
</tr>
<tr>
<td>Video summarization, approaches to</td>
<td>446–447</td>
</tr>
<tr>
<td>Video surveillance, global market for</td>
<td>439</td>
</tr>
<tr>
<td>Video syntactic analysis, in CBVR</td>
<td>35</td>
</tr>
<tr>
<td>Video tracking and retrieval system (VORTEX)</td>
<td>450</td>
</tr>
<tr>
<td>View invariance, in event recognition</td>
<td>452</td>
</tr>
<tr>
<td>Virtual worlds</td>
<td>348</td>
</tr>
<tr>
<td>VISMAP</td>
<td>36</td>
</tr>
<tr>
<td>Visual concepts</td>
<td></td>
</tr>
<tr>
<td>Annotation mechanisms for</td>
<td>159–161</td>
</tr>
<tr>
<td>Designing ontologies of detectable</td>
<td>175–176</td>
</tr>
<tr>
<td>Learning visual models for</td>
<td>162–163</td>
</tr>
<tr>
<td>Context-based modeling</td>
<td>166</td>
</tr>
<tr>
<td>Data-driven modeling</td>
<td>163–165</td>
</tr>
<tr>
<td>Large-dataset learning</td>
<td>166–167</td>
</tr>
<tr>
<td>Ontology of</td>
<td>156</td>
</tr>
<tr>
<td>Visual features, low-level</td>
<td>325</td>
</tr>
<tr>
<td>Visual ontologies, designing</td>
<td></td>
</tr>
<tr>
<td>80 Million Tiny Images dataset</td>
<td>158–159</td>
</tr>
<tr>
<td>Kodak’s consumer video benchmark dataset</td>
<td>158</td>
</tr>
<tr>
<td>Large-scale concept ontology for multimedia</td>
<td>157</td>
</tr>
<tr>
<td>MediaMill Challenge</td>
<td>157–158</td>
</tr>
<tr>
<td>VEML and VERL</td>
<td>159</td>
</tr>
<tr>
<td>Visual search</td>
<td></td>
</tr>
<tr>
<td>Applications in</td>
<td>167</td>
</tr>
<tr>
<td>Automatic search</td>
<td>168, 168–171, 170</td>
</tr>
<tr>
<td>Interactive search</td>
<td>171–172</td>
</tr>
<tr>
<td>Research in</td>
<td>167</td>
</tr>
<tr>
<td>Visual search interface, concept-based</td>
<td>330</td>
</tr>
<tr>
<td>VisualSEEK</td>
<td>36</td>
</tr>
<tr>
<td>Visual semantics</td>
<td></td>
</tr>
<tr>
<td>Extraction technologies</td>
<td>324–326</td>
</tr>
<tr>
<td>Scalable storage and indexing</td>
<td></td>
</tr>
<tr>
<td>Concept system architecture</td>
<td>328–331, 329, 330</td>
</tr>
<tr>
<td>Interactive user interface</td>
<td>331–333</td>
</tr>
<tr>
<td>Miracle</td>
<td>326–328, 327, 328</td>
</tr>
<tr>
<td>Search experiments in</td>
<td></td>
</tr>
<tr>
<td>Classifier performance</td>
<td>334, 334–336, 335, 336</td>
</tr>
<tr>
<td>Data subset for</td>
<td>333</td>
</tr>
<tr>
<td>Execution profile</td>
<td>337</td>
</tr>
<tr>
<td>Utility of filtering</td>
<td>336–337</td>
</tr>
</tbody>
</table>
voice over Internet protocol (VoIP), 348
Voice over Internet Protocol. See voice over protocol Internet
VORTEX. See video tracking and retrieval system

Wald’s sequential probability ratio test (SPRT), 56–57
Wall Street Journal (WSJ), 14
W3C. See World Wide Web Consortium
WDS. See word sense disambiguation
weaving domain models, 238, 238–239
the Web. See also semantic Web
autonomy of, 201
as collection of autonomous databases, 205
knowledge generation on, 343
community building, 345
open innovation principle, 345
peer-to-peer networking, 342–343
privacy issues, 345
Web 2.0, 344
multichannel environment of, 347
and total information access, 202
Web 2.0, 202, 303, 306, 341, 342, 343
notion of, 71
semantic content on, 344
technology, 354
Web communities, emergence of, 343–344
Web crawling, 78, 80
WebEVA, 160–161
Web graph, 70
defined, 71
termology used in modeling, 71–72
Web integration, 222
Weblogs, 111
Web mining
categories of, 70
link analysis in, 70
research in, 72–73
Web mining literature, 69
Web Ontology Language (OWL), 132, 201, 421, 422, 467
advantages and disadvantages of, 229
as backbone of Web, 202
and class-based modeling, 239
development of, 252
equality encoded in, 212
feature models with, 235–236
to integrate Citeseer and DBLP, 201
and reasoning, 231–232
and UML class-based modeling, 232, 232–235, 233
Web page access times, 70
Web page ranking, 80
Web search, 4, 352–353. See also search
Web Service Business Process Execution Language (WS-BPEL), 290
Web Service Definition Language (WSDL), 189, 290, 467
Web services, 285–286
adding semantics to
framework for, 292–294, 293
reasons for, 291
semantic Web, 291
semantic Web services, 292–294, 293
artifacts of, 288–289, 289
basic components of, 298
benefits of, 287
composition of, 295
extended framework of, 290, 290
features of, 286–290, 287, 289, 290
nature of, 286
service composition for, 289
Web services architecture (WSA), 287, 287
operations of, 288, 289
roles in, 288, 289
Web services description language (WSDL), 253
Web Services Distributed Management (WSDM), 287
Web service servers, 290
Web Services Security (WSS), 287
Web source integration, alternative
approach to, 202
WFM. See workflow management
WFMC. See Workflow Management Coalition
widgets, defined, 347
WikiAnswers, 353
Wikipedia, 344
Wikipedia ecosystem, 319
Windows Media Video, 327
word knowledge axioms, 405–406
WordNet, 13, 17, 167, 170
domain concepts in, 399–400
format of, 22
semantic connectivity of, 381
sense inventory of, 22
synset-synset relations of, 402
used in QA, 380
uses for, 22–23
word sense disambiguation (WSD), 17, 379, 415
Workflow Management Coalition (WfMC), 185
workflow management (WFM), 182, 184
Workflow Process Definition Language (WPDL), 185
World Wide Web, participative websites of, 341. See also Web
World Wide Web Consortium (W3C), 285, 421, 468
WPDL. See Workflow Process Definition Language
WSA. See Web services architecture
WS-BPEL. See Web Service Business Process Execution Language
WSDL. See Web Service Definition Language; Web services description language
WSDM. See Web Services Distributed Management
WSJ. See Wall Street Journal
WSS. See Web Services Security
XML. See Extensible Markup Language; XML Process Definition Language
XML Process Definition Language (XPDL), 181, 193
activity structures in, 186
workflow process definition in, 185
XML-based, 185
XWN. See eXtended WordNet
XWN-KB, 416
XWN-KB axioms, 405–406
XWN knowledge base, 381, 381
Yahoo, search engines from, 162
Yahoo! Answers, 353
Yet Another Workflow Language (YAWL), 185
YinYang system, for learning/refining, 138
YouTube, 33, 161, 343. See also social networks
YSO. See General Finnish Ontology
Z-Norm statistics collection, for speaker recognition, 125–126