```
f0005:


W_Fdic:
the                 : 1151    and                 : 820     of                  : 663     to                  : 447
data                : 411     -rrb-               : 357     -lrb-               : 352     is                  : 291
in                  : 226     knowledge           : 198     can                 : 177     big                 : 176
for                 : 170     system              : 135     be                  : 123     with                : 122
from                : 120     that                : 114     human               : 113     as                  : 112
are                 : 112     on                  : 111     space               : 110     representation      : 105
it                  : 101     computing           : 97      different           : 93      by                  : 89
not                 : 84      which               : 79      between             : 79      semantic            : 75
research            : 73      various             : 70      or                  : 69      cognitive           : 68
through             : 64      an                  : 63      systems             : 62      concepts            : 61
dimensions          : 61      information         : 60      this                : 58      scientific          : 54
some                : 52      into                : 50      has                 : 49      such                : 49
e.g.                : 48      problem             : 48      new                 : 47      network             : 47
links               : 47      modeling            : 46      complex             : 46      social              : 46
other               : 46      more                : 43      analysis            : 43      cyber-infrastructure: 42
machine             : 41      process             : 41      representations     : 41      science             : 40
rules               : 40      development         : 40      behaviors           : 40      example             : 39
people              : 38      one                 : 37      observed            : 36      link                : 36
's                  : 35      following           : 35      interaction         : 35      problems            : 34
but                 : 34      structure           : 33      models              : 32      model               : 32
scientists          : 31      processing          : 31      use                 : 31      management          : 31
have                : 31      may                 : 30      important           : 30      including           : 30
web                 : 30      paradigm            : 29      classification      : 28      according           : 28
help                : 28      networks            : 28      many                : 27      dimension           : 27
been                : 26      what                : 26      community           : 26      also                : 26
if                  : 25      world               : 25      at                  : 25      zhuge               : 25
ability             : 25      like                : 25      consists            : 24      provide             : 24
turing              : 24      each                : 24      relations           : 24      architecture        : 24
understanding       : 24      will                : 24      thinking            : 23      its                 : 23
nature              : 22      time                : 22      discover            : 22      mapping             : 22
reasoning           : 22      understand          : 22      implicit            : 22      great               : 22
physical            : 22      multi-dimensional   : 22      computer            : 22      machines            : 21
operations          : 21      way                 : 21      domain              : 21      papers              : 21
communities         : 21      services            : 21      used                : 21      using               : 21
often               : 21      basic               : 20      devices             : 20      applications        : 20
how                 : 20      than                : 20      only                : 20      there               : 20
computers           : 20      fundamental         : 20      generate            : 20      motivation          : 20
users               : 20      society             : 20      so                  : 19      these               : 19
while               : 19      concerns            : 19      semantics           : 18      concept             : 18
environment         : 18      evolution           : 18      internet            : 18      any                 : 18
form                : 18      two                 : 18      meaning             : 18      existing            : 18
methods             : 18      processes           : 18      support             : 18      make                : 17
we                  : 17      however             : 17      global              : 17      managing            : 17
generated           : 17      nodes               : 17      things              : 17      interactions        : 17
figure              : 16      language            : 16      technologies        : 16      resources           : 16
business            : 16      et                  : 15      infrastructure      : 15      find                : 15
```

Word	Count	Word	Count	Word	Count	Word	Count
when	15	they	14	target	14	discovery	14
spaces	14	learning	14	enable	14	external	14
researchers	14	certain	14	represent	14	texts	14
analyzing	14	needs	14	reflect	14	issue	14
exploration	14	etc.	14	objects	14	2012	14
who	14	words	14	value	14	solution	13
behavior	13	current	13	should	13	establishing	13
reading	13	determine	13	search	13	experience	13
hard	13	distributed	13	set	13	organization	13
decision	13	industrial	13	could	13	their	13
indicators	13	formation	12	another	12	do	12
economic	12	sharing	12	key	12	status	12
symbiosis	12	all	12	number	12	stage	12
traditional	12	scale	12	appropriate	12	influence	12
practice	12	need	12	text	12	view	12
know	12	because	12	about	12	evolving	11
better	11	principles	11	enables	11	enterprise	11
section	11	automatically	11	structures	11	multiple	11
small	11	share	11	interact	11	interactive	11
individual	11	source	11	intelligence	11	intelligent	11
result	11	point	11	does	11	software	11
suitable	10	algorithms	10	production	10	then	10
mind	10	input	10	no	10	discovering	10
usually	10	economy	10	natural	10	cognition	10
open	10	aspects	10	provides	10	storage	10
strategies	10	operation	10	beyond	10	al.	10
impact	10	real	10	analyze	10	categories	10
manage	10	communication	10	category	10	necessary	10
limited	9	represented	9	study	9	analytics	9
requests	9	basis	9	life	9	aim	9
was	9	role	9	requirements	9	explicit	9
within	9	given	9	wide	9	generalization	9
where	9	developing	9	technology	9	same	9
ccp	9	power	9	citation	9	design	9
sensors	9	relationship	9	part	9	during	9
both	9	questions	9	integration	9	able	9
sources	9	work	8	methodology	8	user	8
observation	8	flow	8	method	8	three	8
evolve	8	depicts	8	diverse	8	topic	8
derive	8	forms	8	significantly	8	mechanisms	8
statistics	8	potential	8	developed	8	resource	8
enabling	8	engineering	8	without	8	generates	8
general	8	contains	8	particular	8	hierarchy	8
generation	8	linking	8	kind	8	internal	8
relation	8	generating	8	gap	8	decentralized	8
transformation	8	helps	8	reflects	8	2011	8
kepler	8	based	8	class	8	ccps	7
1999	7	verify	7	types	7	correctness	7
organize	7	integrate	7	quickly	7	specialization	7

cycle	: 7	candidate	: 7	''	: 7	realize	: 7
fourth	: 7	solve	: 7	further	: 7	solving	: 7
members	: 7	definition	: 7	aims	: 7	build	: 7
finding	: 7	most	: 7	simulating	: 7	raise	: 7
strategy	: 7	become	: 7	searching	: 7	2008	: 7
access	: 7	challenge	: 7	local	: 7	areas	: 7
humans	: 7	harder	: 7	capture	: 7	function	: 7
real-time	: 7	conjecture	: 6	every	: 6	disciplines	: 6
selected	: 6	law	: 6	writing	: 6	them	: 6
represents	: 6	content	: 6	problem-solving	: 6	features	: 6
roles	: 6	depends	: 6	limitation	: 6	understandable	: 6
manages	: 6	computation	: 6	revolution	: 6	cost	: 6
market	: 6	scope	: 6	analogical	: 6	ibm	: 6
growing	: 6	designed	: 6	mainly	: 6	group	: 6
theory	: 6	indicate	: 6	exploring	: 6	mining	: 6
representing	: 6	performance	: 6	concern	: 6	develop	: 6
changing	: 6	being	: 6	relevant	: 6	read	: 6
test	: 6	industry	: 6	instruments	: 6	hardware	: 6
building	: 6	decisions	: 6	large	: 6	operating	: 6
establish	: 6	evolves	: 6	sense	: 6	rather	: 6
propose	: 6	level	: 6	capability	: 6	subsystem	: 6
idea	: 6	denoted	: 6	play	: 6	creating	: 6
paradigms	: 6	verification	: 6	2006	: 6	languages	: 6
scales	: 6	effectively	: 6	out	: 6	planning	: 6
gray	: 6	efficiency	: 6	table	: 6	architectures	: 6
obtain	: 6	phenomena	: 6	includes	: 6	volume	: 6
force	: 5	even	: 5	above	: 5	consisting	: 5
approaches	: 5	guide	: 5	changes	: 5	word	: 5
involve	: 5	indicates	: 5	answer	: 5	abstraction	: 5
effective	: 5	operate	: 5	independent	: 5	generative	: 5
stream	: 5	programs	: 5	contents	: 5	proposed	: 5
rich	: 5	automatic	: 5	artificial	: 5	extend	: 5
country	: 5	engines	: 5	several	: 5	just	: 5
facts	: 5	previous	: 5	regarded	: 5	manufacturing	: 5
connected	: 5	advantages	: 5	neumann	: 5	transform	: 5
differences	: 5	node	: 5	leads	: 5	along	: 5
hilbert	: 5	insights	: 5	map	: 5	product	: 5
years	: 5	platform	: 5	nor	: 5	shown	: 5
programming	: 5	directly	: 5	illness	: 5	say	: 5
online	: 5	ways	: 5	formed	: 5	characteristics	: 5
minds	: 5	empiricism	: 5	ontology	: 5	valuable	: 5
connect	: 5	investment	: 5	inspired	: 5	goal	: 5
framework	: 5	difficult	: 5	analogy	: 5	experiences	: 5
significant	: 5	shared	: 5	unconscious	: 5	interfaces	: 5
long-term	: 5	collected	: 5	levels	: 5	useful	: 5
discipline	: 5	tables	: 5	collect	: 5	accelerate	: 5
run	: 5	computational	: 5	required	: 5	2009	: 5
results	: 5	products	: 5	involves	: 5	co-evolve	: 5
high-performance	: 5	strategic	: 5	monkey	: 5	efficiently	: 5

mechanism	: 5	url	: 5	databases	: 5	selection	: 5
insight	: 5	coordinating	: 5	processed	: 5	neither	: 5
attributes	: 5	al	: 5	layer	: 5	effect	: 5
patterns	: 5	whether	: 5	webpages	: 5	reflecting	: 5
factors	: 5	relationships	: 4	local-to-global	: 4	program	: 4
type	: 4	1998	: 4	organized	: 4	worldview	: 4
cyberspace	: 4	correlation	: 4	data-intensive	: 4	over	: 4
personal	: 4	unknown	: 4	too	: 4	isolated	: 4
principle	: 4	inspire	: 4	solutions	: 4	explain	: 4
techniques	: 4	continually	: 4	unable	: 4	approach	: 4
improve	: 4	simplification	: 4	dynamically	: 4	realizing	: 4
linked	: 4	visualization	: 4	core	: 4	rely	: 4
focus	: 4	layers	: 4	cyber	: 4	marketing	: 4
change	: 4	working	: 4	prove	: 4	theoretical	: 4
cases	: 4	definitions	: 4	indeed	: 4	still	: 4
motion	: 4	predictive	: 4	bio-symbiosis	: 4	answering	: 4
sciences	: 4	discovered	: 4	get	: 4	mapped	: 4
detect	: 4	heterogeneous	: 4	cities	: 4	brahe	: 4
period	: 4	good	: 4	events	: 4	driven	: 4
relies	: 4	supports	: 4	competition	: 4	database	: 4
discusses	: 4	image	: 4	area	: 4	complete	: 4
activities	: 4	influences	: 4	retrieval	: 4	energy	: 4
health	: 4	toward	: 4	dependent	: 4	sustainable	: 4
capabilities	: 4	create	: 4	due	: 4	demand	: 4
technical	: 4	lower	: 4	task	: 4	abilities	: 4
...	: 4	individuals	: 4	forming	: 4	consist	: 4
values	: 4	explore	: 4	cloud	: 4	isomorphism	: 4
object-oriented	: 4	symbols	: 4	facilitates	: 4	2010	: 4
verifying	: 4	constitute	: 4	cause-effect	: 4	proposing	: 4
environmental	: 4	regards	: 4	high-level	: 4	knowing	: 4
requirement	: 4	correlations	: 4	interacting	: 4	incorporating	: 4
discuss	: 4	extends	: 4	recognition	: 4	selecting	: 4
getting	: 4	record	: 4	computable	: 4	contribute	: 4
variety	: 4	four	: 3	calculate	: 3	pragmatism	: 3
explained	: 3	therefore	: 3	recommend	: 3	rationalism	: 3
1993	: 3	theories	: 3	era	: 3	far	: 3
writers	: 3	description	: 3	after	: 3	meaningful	: 3
un-computable	: 3	combination	: 3	enrich	: 3	extract	: 3
standard	: 3	onto	: 3	rejected	: 3	classes	: 3
extracting	: 3	effectiveness	: 3	points	: 3	participate	: 3
blei	: 3	wikipedia	: 3	cooperation	: 3	extent	: 3
essentially	: 3	transformed	: 3	location	: 3	split	: 3
hand	: 3	1974	: 3	materials	: 3	equipment	: 3
easy	: 3	possible	: 3	specific	: 3	steps	: 3
comments	: 3	rep	: 3	ensure	: 3	efforts	: 3
obtaining	: 3	google	: 3	man-computer	: 3	constantly	: 3
proved	: 3	request	: 3	exist	: 3	unaware	: 3
relational	: 3	transportation	: 3	shift	: 3	commonly	: 3
studies	: 3	memory	: 3	selects	: 3	effort	: 3

making	: 3	conscious	: 3	webpage	: 3	coordinates	: 3
policy	: 3	views	: 3	classifying	: 3	profit	: 3
increase	: 3	attracted	: 3	shows	: 3	possibility	: 3
inputting	: 3	complicated	: 3	neglect	: 3	first	: 3
question	: 3	city	: 3	structured	: 3	accurately	: 3
future	: 3	were	: 3	cyber-concepts	: 3	efficient	: 3
price	: 3	pages	: 3	especially	: 3	wittrock	: 3
laws	: 3	analytic	: 3	enriched	: 3	deployed	: 3
scientist	: 3	mature	: 3	among	: 3	those	: 3
extended	: 3	components	: 3	money	: 3	speed	: 3
death	: 3	images	: 3	understandings	: 3	communicate	: 3
develops	: 3	addition	: 3	greatly	: 3	sales	: 3
symbol	: 3	deriving	: 3	browsers	: 3	difference	: 3
ten	: 3	invention	: 3	public	: 3	inspires	: 3
select	: 3	self-organize	: 3	specialized	: 3	history	: 3
human-to-human	: 3	actually	: 3	easily	: 3	document	: 3
experiencing	: 3	mental	: 3	funding	: 3	done	: 3
least	: 3	newell	: 3	authors	: 3	determines	: 3
infrastructures	: 3	mobile	: 3	sometimes	: 3	velocity	: 3
physics	: 3	failed	: 3	experiment	: 3	his	: 3
stored	: 3	common	: 3	scanning	: 3	whole	: 3
treatment	: 3	century	: 3	widely	: 3	flows	: 3
domains	: 3	person	: 3	evaluate	: 3	mathematical	: 3
experienced	: 3	innovation	: 3	probabilistic	: 3	globally	: 3
application	: 3	explaining	: 3	2007	: 3	proposition	: 3
go	: 3	simon	: 3	include	: 3	plays	: 3
cyber-physical	: 3	others	: 3	receive	: 3	rdf	: 3
tools	: 3	assumptions	: 3	g?del	: 3	2013	: 3
indexing	: 3	accompanies	: 3	related	: 3	human-level	: 3
special	: 3	memex	: 3	facilitate	: 3	powerful	: 3
adopted	: 3	patients	: 3	distinguished	: 3	jacobson	: 3
accuracy	: 3	gain	: 3	emerging	: 3	inspiring	: 3
means	: 3	brain	: 3	influenced	: 3	exists	: 3
berners-lee	: 3	summarization	: 3	citations	: 3	streams	: 3
unclear	: 3	i.e.	: 3	define	: 3	senses	: 3
examine	: 3	thus	: 3	units	: 3	material	: 3
sets	: 3	accurate	: 3	e-science	: 3	simple	: 3
smart	: 3	agents	: 3	growth	: 3	lead	: 3
expansion	: 3	paper	: 3	surge	: 3	own	: 3
utility	: 3	1989	: 3	goals	: 3	distribution	: 3
functions	: 3	compared	: 3	virtual	: 3	enterprises	: 3
consider	: 2	under	: 2	rational	: 2	graph-based	: 2
companies	: 2	indices	: 2	disclose	: 2	consistent	: 2
established	: 2	protection	: 2	china	: 2	obtained	: 2
changed	: 2	analysts	: 2	successful	: 2	hold	: 2
1996	: 2	feasible	: 2	attract	: 2	guarantee	: 2
thing	: 2	hot	: 2	transforming	: 2	wrong	: 2
hypotheses	: 2	reforming	: 2	before	: 2	fix	: 2
classified	: 2	combining	: 2	conjectures	: 2	mccarthy	: 2

adapt	: 2	free	: 2	created	: 2	starts	: 2
render	: 2	researches	: 2	implicates	: 2	service	: 2
top	: 2	needed	: 2	insightful	: 2	project	: 2
co-evolution	: 2	analyzers	: 2	1960	: 2	object	: 2
extending	: 2	consumer	: 2	planetary	: 2	latent	: 2
implementation	: 2	bush	: 2	plato	: 2	report	: 2
fields	: 2	implication	: 2	projections	: 2	on-demand	: 2
psychologists	: 2	merging	: 2	collecting	: 2	active	: 2
much	: 2	air	: 2	property	: 2	ip	: 2
perform	: 2	infeasible	: 2	inventors	: 2	commonsense	: 2
normalization	: 2	maximizing	: 2	1978	: 2	simulated	: 2
unified	: 2	newton	: 2	identify	: 2	transforms	: 2
designers	: 2	objective	: 2	advanced	: 2	security	: 2
indirect	: 2	arrest	: 2	meanings	: 2	predicting	: 2
accepts	: 2	entrants	: 2	becoming	: 2	stages	: 2
abstract	: 2	constructed	: 2	generally	: 2	reality	: 2
digital	: 2	warehouse	: 2	sql	: 2	longer	: 2
together	: 2	quantity	: 2	chain	: 2	1945	: 2
join	: 2	standards	: 2	trend	: 2	supporting	: 2
meta-cognitive	: 2	water	: 2	groups	: 2	address	: 2
box	: 2	tasks	: 2	predictions	: 2	live	: 2
thousands	: 2	flu	: 2	cat	: 2	claim	: 2
predict	: 2	discussion	: 2	improving	: 2	grow	: 2
man	: 2	sectors	: 2	structuring	: 2	statistical	: 2
globalization	: 2	constitutes	: 2	coordinated	: 2	main	: 2
matches	: 2	retrieve	: 2	challenges	: 2	emerges	: 2
1995	: 2	axioms	: 2	massive	: 2	origin	: 2
bluemix	: 2	carry	: 2	impossible	: 2	summarize	: 2
engineer	: 2	knowledge-processing	: 2	specify	: 2	constructionism	: 2
topics	: 2	ideas	: 2	trace	: 2	normal	: 2
medias	: 2	enough	: 2	motivations	: 2	expression	: 2
innovations	: 2	maintained	: 2	moreover	: 2	capable	: 2
combined	: 2	observe	: 2	html	: 2	fodor	: 2
locality	: 2	coordinate	: 2	captured	: 2	scheduled	: 2
unveil	: 2	symbolism	: 2	identifying	: 2	server	: 2
benefit	: 2	output	: 2	matching	: 2	critical	: 2
accessing	: 2	references	: 2	nowadays	: 2	hey	: 2
applying	: 2	planets	: 2	statuses	: 2	field	: 2
mathematics	: 2	collaborative	: 2	separate	: 2	students	: 2
tiger	: 2	lack	: 2	generalize	: 2	opportunities	: 2
cause-	: 2	very	: 2	condition	: 2	broader	: 2
self-contained	: 2	rate	: 2	perspective	: 2	consumers	: 2
answers	: 2	observing	: 2	published	: 2	specialize	: 2
intensive	: 2	lowering	: 2	tested	: 2	known	: 2
evolved	: 2	learn	: 2	compare	: 2	impacts	: 2
concept-level	: 2	human-to-data	: 2	derived	: 2	tries	: 2
verified	: 2	shortcomings	: 2	essence	: 2	verifies	: 2
formulate	: 2	reduce	: 2	solved	: 2	since	: 2
reason	: 2	base	: 2	imaging	: 2	rejects	: 2

major	: 2	instances	: 2	utilization	: 2	introduction	: 2
store	: 2	translation	: 2	believe	: 2	clarifying	: 2
built	: 2	extracted	: 2	electric	: 2	programmers	: 2
measures	: 2	plan	: 2	arising	: 2	clear	: 2
institutions	: 2	joining	: 2	sparrow	: 2	indicator	: 2
hope	: 2	knowledge-based	: 2	tree	: 2	see	: 2
expertise	: 2	connectionism	: 2	expert	: 2	conditions	: 2
attention	: 2	distinguish	: 2	improved	: 2	large-scale	: 2
throughout	: 2	decline	: 2	lattice	: 2	johannes	: 2
maintenance	: 2	adoption	: 2	prices	: 2	empirical	: 2
evaluating	: 2	computed	: 2	pylyshyn	: 2	itself	: 2
hadoop	: 2	higher	: 2	comprehensive	: 2	uses	: 2
deployment	: 2	accepted	: 2	readers	: 2	generalized	: 2
customers	: 2	gradually	: 2	connecting	: 2	state-of-the-art	: 2
retrieving	: 2	long	: 2	veracity	: 2	criteria	: 2
up	: 2	called	: 2	storing	: 2	constant	: 2
accessibility	: 2	single	: 2	organizational	: 2	priori	: 2
revision	: 2	draw	: 2	provided	: 2	replace	: 2
2001	: 2	2005	: 2	requires	: 2	once	: 2
query	: 2	issues	: 2	disposal	: 2	citing	: 2
stable	: 2	grid	: 2	transmission	: 2	try	: 2
licklider	: 2	transmit	: 2	real-world	: 2	focuses	: 2
respectively	: 2	delivering	: 2	leaving	: 2	makes	: 2
next	: 2	depicted	: 2	reciprocity	: 2	themselves	: 2
optimizing	: 2	popper	: 2	customer	: 2	integrating	: 2
meet	: 2	control	: 2	six	: 2	normalize	: 2
monitoring	: 2	mid-term	: 2	estimating	: 2	2014	: 2
constraints	: 2	separating	: 2	astronomy	: 2	posteriori	: 2
dominated	: 2	cause	: 2	networking	: 2	4th	: 2
quality	: 2	synthesizing	: 2	explanation	: 2	simulate	: 2
policeman	: 2	kleinberg	: 2	providing	: 2	false	: 2
instance	: 2	why	: 2	bring	: 2	operational	: 2
candidates	: 2	familiar	: 2	compute	: 2	operates	: 2
enhanced	: 2	pattern	: 2	use-cases	: 2	tend	: 2
progress	: 2	importance	: 2	middle-level	: 2	demonstrate	: 2
commenting	: 2	2002	: 2	estimation	: 2	fayyad	: 2
otherwise	: 2	environments	: 2	adding	: 2	trajectory	: 2
challenged	: 2	proposal	: 2	ontologies	: 2	suggested	: 2
tycho	: 2	dual	: 2	finite	: 2	unconventional	: 2
expand	: 2	modeled	: 2	thought	: 2	sensing	: 2
underlying	: 2	macroscopic	: 2	coordination	: 2	low-level	: 2
propositions	: 2	crawled	: 2	works	: 2	accessible	: 2
thief	: 2	recommendation	: 2	projection	: 2	avoid	: 2
locate	: 2	biology	: 2	extension	: 2	carries	: 2
multi-disciplinary	: 2	owl	: 2	1982	: 2	1980	: 2
transfer	: 2	1988	: 2	mappings	: 2	repeated	: 2
eat	: 2	he	: 2	made	: 2	mechanics	: 2
recognize	: 2	combine	: 2	conclusion	: 2	ultimately	: 2
inspiration	: 2	ranks	: 2	writings	: 1	homomorphism	: 1

```
magnetic              : 1        heliocentric        : 1        prognostics          : 1        prusak              : 1
electricity           : 1        behaviours          : 1        multi-agents         : 1        ontological         : 1
summarizes            : 1        connects            : 1        human-machine        : 1        reforms             : 1
classifications       : 1        vast                : 1        open-source          : 1        concept-space       : 1
non-action-centered   : 1        vector              : 1        guiding              : 1        commented           : 1
specially             : 1        phones              : 1        direct               : 1        estimated           : 1
organisms             : 1        specification       : 1        conduct              : 1        ever                : 1
refinement            : 1        mccallum            : 1        military             : 1        adopting            : 1
diameter              : 1        divide              : 1        concept-to-concept   : 1        highly              : 1
brought               : 1        http://www.ibm.com/big-data: 1        forums               : 1        landscape           : 1
m.                    : 1        fragmentary         : 1        gries                : 1        brings              : 1
yahoo                 : 1        award               : 1        hofmann              : 1        separates           : 1
continual             : 1        must                : 1        1990                 : 1        1994                : 1
data-driven           : 1        indicated           : 1        give                 : 1        cited               : 1
updated               : 1        reviewing           : 1        end                  : 1        feature             : 1
hofman                : 1        significance        : 1        ordinary             : 1        beauty              : 1
input-output          : 1        misunderstanding    : 1        curiosity            : 1        minimizes           : 1
sparql                : 1        think               : 1        lengths              : 1        maintain            : 1
order                 : 1        restriction         : 1        interpretation       : 1        feedback            : 1
satisfied             : 1        innovative          : 1        satisfies            : 1        url-based           : 1
knowledge-intensive   : 1        encapsulated        : 1        reasonability        : 1        break               : 1
penetration           : 1        reasonable          : 1        mean                 : 1
http://www.research.ibm.com/cognitive-computing: 1
telescope             : 1        literature          : 1        clauset              : 1        independency        : 1
driving               : 1        restricted          : 1        reader               : 1        xu                  : 1
foundation            : 1        linear              : 1        sensory              : 1        detecting           : 1
r1                    : 1        r2                  : 1        +3                   : 1        +2                  : 1
+5                    : 1        recite              : 1        rank                 : 1        channels            : 1
synthesize            : 1        enumerate           : 1        implicated           : 1        cartesian           : 1
bottom-up             : 1        similarly           : 1        engagement           : 1        goldbach            : 1
plentiful             : 1        corpus              : 1        john                 : 1        cyber-concept       : 1
enhancing             : 1        tool                : 1        albert               : 1        wisdom              : 1
commonsenses          : 1        incur               : 1        wasted               : 1        symptom             : 1
distance              : 1        connectionist       : 1        enabled              : 1        normalizing         : 1
matter                : 1        acquisition         : 1        sees                 : 1        navigate            : 1
modern                : 1        raw                 : 1        increment            : 1        1969                : 1
responsible           : 1        indexed             : 1        https://smartmanufacturingcoalition.org: 1        optimized           :
1
competitors           : 1        reserve             : 1        one-dimensional      : 1        earth               : 1
pursuing              : 1        salton              : 1        explorations         : 1        localizing          : 1
10                    : 1        scalable            : 1        html-based           : 1        countries           : 1
protocols             : 1        steam               : 1        habit                : 1        correlational       : 1
inappropriate         : 1        r&d                 : 1        modelings            : 1        mcafee              : 1
harvard               : 1        clues               : 1        adapting             : 1        accident            : 1
clancey               : 1        reported            : 1        receives             : 1        ease                : 1
2nd                   : 1        initiative          : 1        flexibly             : 1        actuators.it        : 1
beer                  : 1        interest            : 1        observatory          : 1        argument            : 1
applied               : 1        save                : 1        reciprocal           : 1        halevy              : 1
www.w3.org/rdf/       : 1        davenport           : 1        procedure            : 1        experts             : 1
```

interacts	: 1	suggest	: 1	liben-nowell	: 1	roland	: 1
hierarchies	: 1	grows	: 1	opportunity	: 1	simulates	: 1
narrow	: 1	1976	: 1	1975	: 1	inherit	: 1
1970	: 1	unsuitable	: 1	investments	: 1	non-trivial	: 1
unemployment	: 1	assigned	: 1	had	: 1	passive	: 1
graedel	: 1	collections	: 1	massively	: 1	fusion	: 1
birth	: 1	desire	: 1	psychological	: 1	misled	: 1
common-purpose	: 1	human-to-machine	: 1	facets	: 1	dean	: 1
trained	: 1	born	: 1	statistic	: 1	short-term	: 1
socio-technical	: 1	everything	: 1	participation	: 1	mechanizes	: 1
statistician	: 1	gartner	: 1	costs	: 1	misleading	: 1
unformulated	: 1	raised	: 1	motivate	: 1	locator	: 1
1990s	: 1	reducing	: 1	categorization	: 1	abstractions	: 1
fcm	: 1	anderson	: 1	symphony	: 1	armbrust	: 1
synthesis	: 1	questionable	: 1	medium	: 1	offering	: 1
offer	: 1	simplifications	: 1	failure	: 1	solar	: 1
streaming	: 1	prevents	: 1	model-driven	: 1	document-to-document	: 1
proven	: 1	drive	: 1	problem-oriented	: 1	holding	: 1
developers	: 1	picture	: 1	discharge	: 1	billion	: 1
n1	: 1	n2	: 1	reviewers	: 1	roy	: 1
displaying	: 1	1948	: 1	depend	: 1	condition-action	: 1
graph	: 1	1944	: 1	prolonging	: 1	analogous	: 1
advantage	: 1	k.j.holyoak	: 1	emphasizes	: 1	unfamiliar	: 1
cook	: 1	exact	: 1	presented	: 1	proposals	: 1
item	: 1	community-infrastructure	: 1	upper	: 1	thinkers	: 1
cyber-infrastructures	: 1	dealing	: 1	unrepresented	: 1	shares	: 1
uniform	: 1	sequential	: 1	goes	: 1	falling	: 1
rationalizes	: 1	satisfy	: 1	upgrade	: 1	institute	: 1
studied	: 1	spheres	: 1	resonance	: 1	conveniently	: 1
genuinely	: 1	emerge	: 1	inference	: 1	perspectives	: 1
flexibility	: 1	logically	: 1	reinvention	: 1	positive	: 1
outputs	: 1	minsky	: 1	capturing	: 1	organizations	: 1
harmonious	: 1	renders	: 1	petabytes	: 1	expanding	: 1
agent	: 1	meta-model	: 1	coincident	: 1	heckerman	: 1
dennis	: 1	pre-defined	: 1	divides	: 1	explores	: 1
huge	: 1	smoot	: 1	cradle-to-cradle	: 1	journals	: 1
stability	: 1	experiments	: 1	equip	: 1	observational	: 1
interesting	: 1	jim	: 1	www.w3.org/tr/rdf-sparql-query/: 1	happened	: 1
halt	: 1	unveiling	: 1	records	: 1	1950	: 1
semiotics	: 1	1958	: 1	rendering	: 1	arrows	: 1
realistic	: 1	rethinking	: 1	abnormal	: 1	reorganized	: 1
predefined	: 1	algebra	: 1	emerged	: 1	inevitably	: 1
semi-autonomous	: 1	reber	: 1	quits	: 1	inductive	: 1
advance	: 1	derivation	: 1	curation	: 1	catalog	: 1
turn	: 1	place	: 1	misused	: 1	fetched	: 1
variables	: 1	symbolic	: 1	fmri	: 1	man-machine	: 1
draft	: 1	cost-effective	: 1	cite	: 1	mostly	: 1
continuous	: 1	proving	: 1	absorbs	: 1	11	: 1
13	: 1	12	: 1	15	: 1	14	: 1

Word		Word		Word		Word	
16	: 1	require	: 1	inferring	: 1	locations	: 1
subsystems	: 1	ideal	: 1	take	: 1	converged	: 1
keeps	: 1	paid	: 1	donation	: 1	adaptability	: 1
adopt	: 1	implications	: 1	sale	: 1	dispersed	: 1
german	: 1	workshops	: 1	commitments	: 1	xml	: 1
slow	: 1	ratio	: 1	boyle	: 1	infallibly	: 1
mechanization	: 1	summary	: 1	vision	: 1	lenzerini	: 1
physically	: 1	arouses	: 1	connections	: 1	1921	: 1
1928	: 1	review	: 1	representatives	: 1	forecast	: 1
invokes	: 1	geometric	: 1	across	: 1	jobs	: 1
originated	: 1	analyzer	: 1	analyzed	: 1	acquiring	: 1
kosko	: 1	railway	: 1	cancer	: 1	keqiang	: 1
considering	: 1	epistemology	: 1	analogies	: 1	shortening	: 1
distinguishing	: 1	observers	: 1	bayesian	: 1	evidence	: 1
irrelevant	: 1	case	: 1	n't	: 1	www.w3.org/tr/owl-features/: 1
ongoing	: 1	investigating	: 1	enriches	: 1	conferences	: 1
eventually	: 1	middle	: 1	regularity	: 1	everyday	: 1
binary	: 1	revolutions	: 1	author	: 1	intelligently	: 1
epistemological	: 1	http://www.w3.org/tr/html5/: 1	centuries	: 1	running	: 1
braher	: 1	markup	: 1	extensible	: 1	relied	: 1
actions	: 1	industry-leading	: 1	differentiation	: 1	guides	: 1
heuristic	: 1	improvement	: 1	thoughts	: 1	http://www.imscenter.net: 1
around	: 1	marcus	: 1	early	: 1	traffic	: 1
aiming	: 1	suppliers	: 1	either	: 1	specifies	: 1
bankruptcies	: 1	simulator	: 1	loosely	: 1	shortcoming	: 1
co-constitution	: 1	organizing	: 1	gross	: 1	symbiotic	: 1
refer	: 1	measuring	: 1	leadership	: 1	computing.evolution : 1
sixty	: 1	central	: 1	origins	: 1	wolf	: 1
deerwester	: 1	act	: 1	road	: 1	berger	: 1
einstein	: 1	mark	: 1	co-evolves	: 1	weight	: 1
removing	: 1	lot	: 1	assumes	: 1	human-data	: 1
regard	: 1	co-occurrence	: 1	philosophers	: 1	land	: 1
implies	: 1	fraud	: 1	vehicles	: 1	videos	: 1
imagination	: 1	reliability	: 1	gruber	: 1	again	: 1
assessing	: 1	completeness	: 1	4.0	: 1	green	: 1
wirth	: 1	psychology	: 1	impossibility	: 1	mass	: 1
nelson	: 1	directory	: 1	strings	: 1	forget	: 1
cooperative	: 1	follow	: 1	coauthor	: 1	referring	: 1
removal	: 1	foster	: 1	preserved	: 1	life-cycle	: 1
domain-specific	: 1	joined	: 1	intricately	: 1	contexts	: 1
adjust	: 1	biological	: 1	workloads	: 1	20th	: 1
ghemawat	: 1	cues	: 1	sun	: 1	sum	: 1
overload	: 1	,1969	: 1	subspaces	: 1	learned	: 1
component	: 1	diapers	: 1	compose	: 1	nature-inspired	: 1
provably	: 1	identifiable	: 1	allows	: 1	prior	: 1
provable	: 1	via	: 1	gick	: 1	advocated	: 1
aptitude	: 1	conventional	: 1	takes	: 1	bio-inspired	: 1
compensate	: 1	taken	: 1	initiated	: 1	constructs	: 1
controlling	: 1	keeping	: 1	machine-data-machine: 1	coalition	: 1

categorizing	: 1	paragraph	: 1	szalay	: 1	states	: 1
minimum	: 1	axis	: 1	maps	: 1	transfers	: 1
http://www.google.org/flutrends/: 1		explains	: 1	plans	: 1	communicating	: 1
orbits	: 1	action-centered	: 1	coming	: 1	queries	: 1
lifecycle	: 1	brynjolfsson	: 1	mislead	: 1	discussing	: 1
rayport	: 1	already	: 1	brin	: 1	24	: 1
controllable	: 1	26	: 1	rapidly	: 1	economists	: 1
entscheidungsproblem: 1		microscopic	: 1	speech	: 1	fool	: 1
incompleteness	: 1	association	: 1	fully	: 1	truths	: 1
philosophical	: 1	habits	: 1	self-motivation	: 1	friendship	: 1
investigated	: 1	expect	: 1	measurement	: 1	loops	: 1
event	: 1	co-constitute	: 1	initiatives	: 1	missed	: 1
conceptualizing	: 1	publish	: 1	causally	: 1	friday	: 1
temperature	: 1	benefits	: 1	http://hadoop.apache.og: 1		neglected	: 1
probability	: 1	reflected	: 1	preservation	: 1	neglects	: 1
miss	: 1	heads	: 1	leverage	: 1	leading	: 1
assumption	: 1	statement	: 1	hundred	: 1	schema	: 1
shifted	: 1	measurable	: 1	inventing	: 1	molecular	: 1
system-to-system	: 1	determined	: 1	2020	: 1	risks	: 1
remembers	: 1	deciding	: 1	higher-level	: 1	karl	: 1
outputting	: 1	lie	: 1	nights	: 1	depending	: 1
officers	: 1	recognizing	: 1	analogs	: 1	towards	: 1
serve	: 1	reach	: 1	accepting	: 1	extremely	: 1
salary	: 1	unsupervised	: 1	coincides	: 1	unreasonable	: 1
phenomenon	: 1	fine	: 1	factor	: 1	externalizes	: 1
rest	: 1	him	: 1	deductive	: 1	data-to-data	: 1
activity	: 1	close	: 1	deploying	: 1	gravitation	: 1
threats	: 1	pictures	: 1	currently	: 1	rejecting	: 1
available	: 1	missing	: 1	general-purpose	: 1	hyperlink	: 1
became	: 1	context	: 1	finds	: 1	experimental	: 1
millions	: 1	reasons	: 1	loan	: 1	simply	: 1
upgrades	: 1	expensive	: 1	ensures	: 1	described	: 1
human-human	: 1	ecologists	: 1	http://www.industrialinternetconsortium.org: 1		extreme : 1	
top-down	: 1	transferring	: 1	unify	: 1	solid	: 1
reliable	: 1	optimization	: 1	accidently	: 1	evaluates	: 1
designing	: 1	engineers	: 1	estimate	: 1	belong	: 1
grand	: 1	composition	: 1	undecidable	: 1	viewing	: 1
purpose	: 1	necessity	: 1	recent	: 1	surrogate	: 1
globus	: 1	spent	: 1	machinery	: 1	howe	: 1
named	: 1	1961	: 1	addresses	: 1	relevancy	: 1
guaranteed	: 1	representational	: 1	hyperlinks	: 1	questioned	: 1
theorem	: 1	influencing	: 1	edvac	: 1	deepening	: 1
ecosystems	: 1	projects	: 1	formal	: 1	follows	: 1
signal	: 1	mismatching	: 1	reichman	: 1	popular	: 1
essential	: 1	clustering	: 1	ecology	: 1	meta-computing	: 1
understood	: 1	trends	: 1	describing	: 1	broadband	: 1
cyber-social	: 1	forgets	: 1	step	: 1	usa	: 1
anything	: 1	tracing	: 1	in-depth	: 1	simulation	: 1

consequently	: 1	complementing	: 1	causation	: 1	recreate	: 1
nsf	: 1	servers	: 1	centrality	: 1	behaving	: 1
impressed	: 1	seger	: 1	innate	: 1	bargaining	: 1
forward	: 1	sections	: 1	transformable	: 1	daily-life	: 1
externalizing	: 1	raising	: 1	us	: 1	maturity	: 1
kuhn	: 1	continuously	: 1	bell	: 1	associates	: 1
neglecting	: 1	preventing	: 1	income	: 1	arithmetic	: 1
machine-data	: 1	korf	: 1	fisher	: 1	correlated	: 1
methodologies	: 1	provenance	: 1	age	: 1	departments	: 1
human-data-human	: 1	2003	: 1	2000	: 1	2004	: 1
fahey	: 1	codd	: 1	co-author	: 1	incorporate	: 1
meta-cognition	: 1	copernicus	: 1	concerned	: 1	facebook	: 1
timely	: 1	recreation	: 1	positions	: 1	someday	: 1
odp	: 1	human-computer	: 1	sensation	: 1	video	: 1
makers	: 1	index	: 1	optimize	: 1	giving	: 1
han	: 1	19th	: 1	sviokla	: 1	pushing	: 1
let	: 1	separation	: 1	invented	: 1	deduced	: 1
involved	: 1	1937	: 1	examining	: 1	up-to-date	: 1
formulated	: 1	apple	: 1	names	: 1	causal	: 1
refers	: 1	hears	: 1	consumption	: 1	davisapril	: 1
doubt	: 1	noisy	: 1	deepest	: 1	formally	: 1
mismatch	: 1	cooperate	: 1	carrying	: 1	carried	: 1
obvious	: 1	publications	: 1	closing	: 1	document-to-human	: 1
proof	: 1	tax	: 1	high	: 1	unlimitedly	: 1
united	: 1	varied	: 1	regions	: 1	located	: 1
service-oriented	: 1	establishment	: 1	stock	: 1	blocks	: 1
philosophy	: 1	collection	: 1	distances	: 1	https://translate.google.com: 1
induction	: 1	bind	: 1	scans	: 1	dhar	: 1
chief	: 1	metaphors	: 1	allow	: 1	move	: 1
write	: 1	relativity	: 1	varies	: 1	tenenbaum	: 1
2015	: 1	descriptive	: 1	resolve	: 1	day	: 1
worlds	: 1	profound	: 1	identified	: 1	pathway	: 1
sufficiently	: 1	transmitted	: 1	truth	: 1	l1	: 1
identifies	: 1	subset	: 1	doing	: 1	falsifiability	: 1
frequency	: 1	static	: 1	mediates	: 1	frontier	: 1
integrates	: 1	adaptive	: 1	integrated	: 1	achievements	: 1
high-tech	: 1	completely	: 1	hubble	: 1	geometry	: 1
times	: 1	davis	: 1	explored	: 1	retail	: 1
housing	: 1	reaches	: 1	precisely	: 1	practitioners	: 1
cabig	: 1	branches	: 1	low	: 1	interests	: 1
accompany	: 1	fuzzy	: 1	colleagues	: 1	richer	: 1
shrinks	: 1	fluctuation	: 1	element	: 1	border	: 1
clearly	: 1	viewed	: 1	documents	: 1	newtonian	: 1
best	: 1	grounding	: 1	pursues	: 1	misunas	: 1
axiomatic	: 1	deploy	: 1	intentions	: 1	propagate	: 1
reduces	: 1	stronger	: 1	fact	: 1	impression	: 1
agreed	: 1	portfolio	: 1	debate	: 1	hall	: 1
shaping	: 1	queried	: 1	contain	: 1	shi	: 1
cycles	: 1	constructing	: 1	acquired	: 1	national	: 1

```
operated            : 1    interview          : 1    laureate            : 1    difficulties        : 1
closed              : 1    crude              : 1    george              : 1    tolman              : 1
prediction          : 1    precious           : 1    limits              : 1    tf-idf              : 1
attributed          : 1    machine-to-machine : 1    tactical            : 1    comment             : 1
maximize            : 1    unclean            : 1    tremendous          : 1    waste               : 1
corresponding       : 1    coherence          : 1    bachman             : 1    clusters            : 1
splits              : 1    dataflow           : 1    promotes            : 1    internet-of         : 1
revisited           : 1    discoveries        : 1    supply              : 1    almost              : 1
blood               : 1    linkedin           : 1    helped              : 1    examined            : 1
greater             : 1    productivity       : 1    disparate           : 1    administration      : 1
parts               : 1    planned            : 1    mathematic          : 1    iot                 : 1
transformational    : 1    judgment           : 1    contribution        : 1    keep                : 1
reflection          : 1    http://www.ibm.com/cloud-computing/bluemix/: 1    well                : 1    user-friendly
: 1
stores              : 1    heavily            : 1    hybrid              : 1    half                : 1
domestic            : 1    localize           : 1    inmon               : 1    rapid               : 1
recommending        : 1    maintaining        : 1    usage               : 1    close-loop          : 1
government          : 1    decidable          : 1    five                : 1    supervise           : 1
variants            : 1    page               : 1    regardless          : 1    foreseeable         : 1
twitter             : 1    church             : 1    library             : 1    employment          : 1
merge               : 1    broad              : 1    l2                  : 1    demonstrated        : 1
inaccurate          : 1    self-organization  : 1    although            : 1    allenby             : 1
publishing          : 1    behavior-centered  : 1    universe            : 1    recognized          : 1
converging          : 1    zooms              : 1    assess              : 1    roads               : 1
goal-oriented       : 1    1986               : 1    1985                : 1    1983                : 1
1981                : 1    justifying         : 1    soil                : 1    spiral              : 1
intention           : 1    fuses              : 1    human-to-nature     : 1    biggest             : 1
naturally           : 1    construction       : 1    question-answering  : 1    wise                : 1
ecosystem           : 1    lagging            : 1    display             : 1    strengthens         : 1
universal           : 1    meaningless        : 1    slowing             : 1    education           : 1
detail              : 1    old                : 1    kinds               : 1    diagnosis           : 1
pathways            : 1    persistent         : 1    rule                : 1    volumes             : 1
indirectly          : 1


WP_Fdic:
['the', 'DT']               : 1150    ['and', 'CC']               : 815    ['of', 'IN']           : 663
['to', 'TO']                : 447     ['-rrb-', '-RRB-']          : 354    ['-lrb-', '-LRB-']     : 352
['data', 'NNS']             : 300     ['is', 'VBZ']               : 291    ['in', 'IN']           : 225
['knowledge', 'NN']         : 184     ['can', 'MD']               : 176    ['for', 'IN']          : 170
['big', 'JJ']               : 156     ['system', 'NN']            : 132    ['be', 'VB']           : 123
['with', 'IN']              : 122     ['from', 'IN']              : 120    ['are', 'VBP']         : 112
['on', 'IN']                : 109     ['space', 'NN']             : 108    ['as', 'IN']           : 107
['representation', 'NN']    : 99      ['it', 'PRP']               : 98     ['data', 'NN']         : 91
['different', 'JJ']         : 91      ['by', 'IN']                : 89     ['not', 'RB']          : 84
['which', 'WDT']            : 79      ['between', 'IN']           : 79     ['semantic', 'JJ']     : 74
['human', 'JJ']             : 74      ['various', 'JJ']           : 70     ['research', 'NN']     : 70
['or', 'CC']                : 69      ['that', 'WDT']             : 67     ['through', 'IN']      : 64
['an', 'DT']                : 63      ['dimensions', 'NNS']       : 60     ['systems', 'NNS']     : 60
['concepts', 'NNS']         : 60      ['information', 'NN']       : 60     ['this', 'DT']         : 58
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['cognitive', 'JJ']	: 57	['computing', 'NN']	: 56	['some', 'DT']	: 52
['into', 'IN']	: 50	['scientific', 'JJ']	: 50	['has', 'VBZ']	: 49
['problem', 'NN']	: 48	['such', 'JJ']	: 48	['new', 'JJ']	: 47
['other', 'JJ']	: 46	['network', 'NN']	: 46	['complex', 'JJ']	: 45
['that', 'IN']	: 45	['links', 'NNS']	: 44	['modeling', 'NN']	: 42
['machine', 'NN']	: 41	['analysis', 'NN']	: 41	['social', 'JJ']	: 41
['representations', 'NNS']	: 40	['development', 'NN']	: 40	['example', 'NN']	: 39
['cyber-infrastructure', 'NN']	: 39	['people', 'NNS']	: 38	['behaviors', 'NNS']	: 38
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['interaction', 'NN']	: 33	['models', 'NNS']	: 32	['observed', 'JJ']	: 32
['process', 'NN']	: 32	['structure', 'NN']	: 31	['scientists', 'NNS']	: 31
['may', 'MD']	: 30	['important', 'JJ']	: 30	['including', 'VBG']	: 30
['management', 'NN']	: 30	['model', 'NN']	: 29	['according', 'VBG']	: 28
['classification', 'NN']	: 28	['paradigm', 'NN']	: 28	['networks', 'NNS']	: 28
['have', 'VBP']	: 27	['many', 'JJ']	: 27	['more', 'RBR']	: 26
['been', 'VBN']	: 26	['human', 'NN']	: 26	['also', 'RB']	: 26
['ability', 'NN']	: 25	['zhuge', 'NNP']	: 25	['at', 'IN']	: 25
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['processing', 'NN']	: 22	['multi-dimensional', 'JJ']	: 22	['physical', 'JJ']	: 22
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['big', 'NNP']	: 20	['applications', 'NNS']	: 20	['basic', 'JJ']	: 20
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human-machine	:	['JJ']	reforms	:	['NNS']
classifications	:	['NNS']	local-to-global	:	['JJ']
vast	:	['JJ']	open-source	:	['JJ']
concept-space	:	['NNP']	graph-based	:	['JJ']
companies	:	['NNS']	solution	:	['NN']
non-action-centered	:	['JJ']	vector	:	['NN']
guiding	:	['VBG']	indices	:	['NNS']
commented	:	['VBD']	disclose	:	['VB']
force	:	['NN', 'VBP']	specially	:	['RB']
disciplines	:	['NNS']	phones	:	['NNS']
consistent	:	['JJ']	direct	:	['JJ']
estimated	:	['VBN']	machines	:	['NNS', 'NNPS']
even	:	['RB']	established	:	['VBN']
organisms	:	['NNS']	specification	:	['NN']
selected	:	['VBN']	pragmatism	:	['NN']
above	:	['JJ']	conduct	:	['VB']
new	:	['JJ']	ever	:	['RB']
consisting	:	['VBG']	evolving	:	['JJ', 'NNP', 'VBG']
behavior	:	['NN']	refinement	:	['NN']
protection	:	['NN']	china	:	['NNP']
represented	:	['VBN']	mccallum	:	['NNP']
obtained	:	['VBN']	study	:	['NN', 'VB']
changed	:	['VBN']	approaches	:	['NNS']
guide	:	['VB', 'NN']	analysts	:	['NNS']
military	:	['NN']	adopting	:	['VBG']
suitable	:	['JJ']	changes	:	['NNS', 'VBZ']
diameter	:	['NN']	divide	:	['VBP']
classification	:	['NN']	concept-to-concept	:	['VB']
explained	:	['VBN']	highly	:	['RB']
brought	:	['VBD']	http://www.ibm.com/big-data:		['NNP']
forums	:	['NNS']	landscape	:	['NN']
m.	:	['NNP']	program	:	['NN']
therefore	:	['RB']	recommend	:	['VB', 'NNP', 'VBP']
rationalism	:	['NN']	type	:	['NN']
ccps	:	['NNP', 'NNS']	fragmentary	:	['JJ']
gries	:	['NNP']	successful	:	['JJ']
brings	:	['VBZ']	yahoo	:	['NNP']
award	:	['NN']	hofmann	:	['VB']
separates	:	['VBZ']	continual	:	['JJ']
hold	:	['VB']	must	:	['MD']
1990	:	['CD']	1993	:	['CD']
word	:	['NN']	1994	:	['VBZ']
1996	:	['CD']	1999	:	['CD', 'VBZ']
1998	:	['CD']	work	:	['NN', 'VB']
theories	:	['NNS']	era	:	['NN']

```
concepts            : ['NNS', 'NNP']          example             : ['NN']
data-driven         : ['JJ']                  indicated           : ['VBN']
give                : ['VB']                   cited               : ['VBN']
organized           : ['VBN']                 updated             : ['VBN']
involve             : ['VBP']                  indicates           : ['VBZ']
reviewing           : ['NN']                   feasible            : ['JJ']
attract             : ['VB']                   guarantee           : ['VB', 'NN']
end                 : ['NN']                   worldview           : ['NNP', 'NN']
thing               : ['NN']                   provide             : ['VBP', 'VB']
verify              : ['JJ', 'VB']             feature             : ['NN']
hofman              : ['NNP']                  machine             : ['NN']
far                 : ['RB']                   hot                 : ['JJ']
writers             : ['NNS']                  significance        : ['NN']
answer              : ['VB', 'NN']             ordinary            : ['JJ']
cyberspace          : ['NN', 'VBG']            abstraction         : ['NN']
description         : ['NNP', 'NN']            beauty              : ['NN']
transforming        : ['VBG', 'VB']            turing              : ['NN', 'NNP', 'VBG']
after               : ['IN']                   methodology         : ['NN', 'NNS']
input-output        : ['JJ']                   misunderstanding    : ['VBG']
wrong               : ['JJ']                   curiosity           : ['NN']
minimizes           : ['VBZ']                  law                 : ['NN']
meaningful          : ['JJ']                   types               : ['NNS']
sparql              : ['JJ']                   effective           : ['JJ']
think               : ['VB']                   hypotheses          : ['NNS']
lengths             : ['NNS']                  maintain            : ['VBP']
algorithms          : ['NNS', 'JJ']           correlation         : ['NN']
operate             : ['VB', 'VBP']            data-intensive      : ['JJ']
order               : ['NN']                   reforming           : ['VBG']
operations          : ['NNS']                  restriction         : ['NN']
interpretation      : ['NN']                   feedback            : ['NN']
over                : ['IN', 'RB']             satisfied           : ['JJ']
un-computable       : ['JJ']                   innovative          : ['JJ']
satisfies           : ['VBZ']                  url-based           : ['JJ']
knowledge-intensive : ['JJ']                   before              : ['RB', 'IN']
personal            : ['JJ']                   fix                 : ['JJ', 'NN']
encapsulated        : ['VBN']                  writing             : ['VBG', 'NN']
better              : ['JJR', 'RBR']           production          : ['NN']
then                : ['RB']                   them                : ['PRP']
reasonability       : ['NN']                   combination         : ['NN']
enrich              : ['VB', 'VBP']            break               : ['VB']
penetration         : ['NN']                   they                : ['PRP']
represents          : ['VBZ']                  classified          : ['VBN']
reasonable          : ['JJ']                   each                : ['DT']
mean                : ['VB']                   http://www.research.ibm.com/cognitive-computing:
['NN']
telescope           : ['NNP']                  independent         : ['JJ']
principles          : ['NNS']                  generative          : ['JJ']
literature          : ['NN']                   combining           : ['VBG']
stream              : ['NN']                   extract             : ['VB']
```

clauset	: ['NNP']	conjectures	: ['VBZ', 'NNS']
independency	: ['NN']	network	: ['NN', 'NNP']
driving	: ['VBG']	restricted	: ['VBN']
mccarthy	: ['NNP']	content	: ['NN']
adapt	: ['VB']	reader	: ['NN']
problem-solving	: ['JJ', 'NNP']	xu	: ['NNP']
foundation	: ['NN']	linear	: ['NNP']
free	: ['JJ']	standard	: ['JJ', 'NN']
sensory	: ['NNS']	formation	: ['NN']
detecting	: ['JJ']	r1	: ['NNP']
r2	: ['NNP']	created	: ['VBN']
starts	: ['NNS', 'VBZ']	correctness	: ['JJ', 'NNS', 'NN']
+3	: ['CD']	+2	: ['CD']
+5	: ['CD']	unknown	: ['JJ', 'NN']
onto	: ['IN']	user	: ['NN']
recite	: ['NN']	organize	: ['VB']
features	: ['NNS']	render	: ['VB']
researches	: ['NNS', 'NN']	rank	: ['NN']
implicates	: ['VBZ']	channels	: ['NNS']
synthesize	: ['VBZ']	relations	: ['NNS']
another	: ['DT']	enumerate	: ['VB']
implicated	: ['VBN']	cartesian	: ['JJ']
bottom-up	: ['NN']	service	: ['NN']
similarly	: ['RB']	top	: ['JJ']
engagement	: ['NN']	goldbach	: ['NNP']
plentiful	: ['JJ']	needed	: ['VBN']
too	: ['RB']	corpus	: ['NN']
john	: ['NNP']	insightful	: ['JJ']
cyber-concept	: ['NN']	enhancing	: ['VBG']
tool	: ['NN']	albert	: ['NNP']
rejected	: ['VBN', 'VBD']	wisdom	: ['NN']
commonsenses	: ['JJ']	incur	: ['VB']
wasted	: ['VBD']	symptom	: ['NN']
distance	: ['NN']	target	: ['NN']
roles	: ['NNS']	connectionist	: ['NN']
programs	: ['NNS']	enabled	: ['VBN']
normalizing	: ['VBG']	project	: ['NN', 'NNP']
matter	: ['NN']	classes	: ['NNS', 'NNP']
enables	: ['VBZ']	acquisition	: ['NN']
extracting	: ['VBG']	sees	: ['VBZ']
navigate	: ['VB']	modern	: ['NNP']
mind	: ['NN']	co-evolution	: ['NN']
raw	: ['JJ']	increment	: ['NN']
contents	: ['NNS']	1969	: ['CD']
analyzers	: ['NNS']	responsible	: ['JJ']
1960	: ['CD']	isolated	: ['VBD', 'JJ', 'VBN']
indexed	: ['VBN']	effectiveness	: ['NN']
https://smartmanufacturingcoalition.org: ['VBG']		object	: ['NN']
extending	: ['VBG']	optimized	: ['VBN']

observation	: ['NN']	flow	: ['NN']
competitors	: ['NNS']	points	: ['NNS']
principle	: ['NN', 'VB']	enterprise	: ['NN']
consumer	: ['NN']	section	: ['NNP', 'NN']
reserve	: ['NN']	planetary	: ['JJ']
inspire	: ['VB', 'NN']	one-dimensional	: ['JJ']
solutions	: ['NNS']	participate	: ['VB']
earth	: ['NN']	make	: ['VB', 'VBP']
latent	: ['NN']	proposed	: ['VBD', 'VBN']
implementation	: ['NN']	explain	: ['VB']
bush	: ['NNP']	semantics	: ['NNS']
rich	: ['JJ']	pursuing	: ['VBG']
integrate	: ['VB']	salton	: ['NNP']
do	: ['VBP', 'VB']	explorations	: ['NNS']
localizing	: ['VBG']	10	: ['CD']
plato	: ['NNP']	scalable	: ['JJ']
html-based	: ['JJ']	report	: ['NNP', 'NN']
countries	: ['NNS']	fields	: ['NNS']
method	: ['NN', 'VB']	protocols	: ['NNS']
architecture	: ['NN', 'VBZ']	implication	: ['NN']
automatic	: ['JJ']	steam	: ['NN']
habit	: ['NN']	observed	: ['JJ', 'VBD', 'VBN']
analytics	: ['NNS', 'JJ']	depends	: ['VBZ']
projections	: ['NNS']	blei	: ['NNP']
correlational	: ['JJ']	techniques	: ['NNS']
on-demand	: ['JJ']	inappropriate	: ['JJ']
wikipedia	: ['NNP']	artificial	: ['JJ', 'NN']
continually	: ['RB']	unable	: ['JJ']
cooperation	: ['NN']	r&d	: ['NNP']
approach	: ['NN']	discovery	: ['NN', 'VBZ']
we	: ['PRP']	extend	: ['VB']
nature	: ['NN']	modelings	: ['NNS']
however	: ['RB']	mcafee	: ['VB']
harvard	: ['NNP']	extent	: ['NN']
clues	: ['NNS']	modeling	: ['VB', 'NN', 'JJ', 'VBZ']
improve	: ['VB']	adapting	: ['VBG']
essentially	: ['RB']	accident	: ['NN']
psychologists	: ['NNS']	clancey	: ['NNP']
reported	: ['VBD']	country	: ['NN']
merging	: ['VBG']	cyber-infrastructure	: ['NN', 'NNP', 'JJ']
receives	: ['VBZ']	requests	: ['NNS', 'VBZ']
ease	: ['NN']	collecting	: ['VBG']
2nd	: ['JJ']	active	: ['JJ']
initiative	: ['NN']	flexibly	: ['RB']
engines	: ['NNS']	basis	: ['NN']
simplification	: ['NN']	three	: ['CD']
been	: ['VBN']	quickly	: ['RB']
actuators.it	: ['NN']	beer	: ['NN']
much	: ['RB']	interest	: ['NN']

basic	: ['JJ']		transformed	: ['VBN', 'VBD']
dynamically	: ['RB']		location	: ['NN']
life	: ['NN']		observatory	: ['NN']
argument	: ['NN']		input	: ['VB', 'NN']
applied	: ['VBN']		save	: ['JJ']
reciprocal	: ['JJ']		halevy	: ['NNP']
www.w3.org/rdf/	: ['NNP']		air	: ['NN']
aim	: ['VBP', 'NN']		property	: ['NN']
davenport	: ['NNP']		procedure	: ['NN']
ip	: ['NNP']		is	: ['VBZ']
it	: ['PRP', 'NNP']		experts	: ['NNS']
in	: ['IN', 'RP']		interacts	: ['VBZ']
if	: ['IN']		specialization	: ['NN']
perform	: ['VBP', 'VB']		suggest	: ['VBP']
realizing	: ['VBG']		linked	: ['VBN']
liben-nowell	: ['NNP']		complex	: ['JJ', 'NN']
roland	: ['NNP']		split	: ['VBN', 'NN']
big	: ['JJ', 'NNP']		hierarchies	: ['NNS']
several	: ['JJ']		infeasible	: ['JJ']
grows	: ['VBZ']		inventors	: ['NNS']
evolve	: ['NNS', 'VB']		commonsense	: ['JJ', 'NN']
social	: ['JJ', 'NNP']		hand	: ['NN']
opportunity	: ['NNP']		normalization	: ['NN', 'NNP']
cycle	: ['NN']		simulates	: ['VBZ']
narrow	: ['JJ']		maximizing	: ['VBG']
1978	: ['JJ', 'CD']		1976	: ['CD']
1975	: ['CD']		1974	: ['CD']
inherit	: ['VB']		1970	: ['CD']
unsuitable	: ['VB']		materials	: ['NNS']
simulated	: ['VBN']		the	: ['DT', 'NNP']
paradigm	: ['NN', 'NNP']		investments	: ['NNS']
non-trivial	: ['JJ']		unified	: ['JJ']
just	: ['RB']		unemployment	: ['NN']
newton	: ['NNP']		assigned	: ['VBN']
identify	: ['VB']		transforms	: ['VBZ']
human	: ['JJ', 'NN', 'NNP']		facts	: ['NNS']
previous	: ['JJ']		visualization	: ['VB', 'NNP', 'NN']
designers	: ['NNS']		candidate	: ['NN']
equipment	: ['NN']		regarded	: ['VBN']
had	: ['VBD']		passive	: ['JJ']
graedel	: ['NNP']		collections	: ['NNS']
massively	: ['RB']		easy	: ['JJ']
has	: ['VBZ']		which	: ['WDT']
possible	: ['JJ']		objective	: ['JJ']
fusion	: ['NN']		birth	: ['NN']
depicts	: ['VBZ']		advanced	: ['JJ']
desire	: ['NN']		psychological	: ['JJ']
specific	: ['JJ']		misled	: ['VBN']
steps	: ['NNS']		common-purpose	: ['JJ']

security	: ['NN']	human-to-machine	: ['NN']
facets	: ['NNS']	dean	: ['NNP']
trained	: ['VBN']	people	: ['NNS']
born	: ['VBN']	statistic	: ['NN']
indirect	: ['JJ']	short-term	: ['JJ']
socio-technical	: ['JJ']	for	: ['IN']
comments	: ['NNS']	everything	: ['NN']
arrest	: ['NN']	participation	: ['NN']
core	: ['NN', 'JJ']	meanings	: ['NNS']
rep	: ['NNP', 'VBN']	mechanizes	: ['VBZ']
statistician	: ['NNP']	predicting	: ['VBG']
manufacturing	: ['NN', 'NNP']	gartner	: ['NNP']
limitation	: ['NN']	accepts	: ['VBZ']
entrants	: ['NNS']	costs	: ['NNS']
misleading	: ['JJ']	ensure	: ['VB']
unformulated	: ['JJ']	connected	: ['VBN', 'JJ']
efforts	: ['NNS']	automatically	: ['RB']
raised	: ['VBN']	motivate	: ['VBP']
obtaining	: ['VBG', 'JJ']	advantages	: ['NNS']
locator	: ['NNP']	google	: ['VBG', 'NNP']
1990s	: ['CD']	reducing	: ['VBG']
neumann	: ['NNP']	rely	: ['VB', 'VBP']
categorization	: ['NN']	abstractions	: ['JJ']
man-computer	: ['JJ']	constantly	: ['RB']
transform	: ['VB']	fcm	: ['NNP']
anderson	: ['NNP']	symphony	: ['NN']
way	: ['NN']	armbrust	: ['NNP']
was	: ['VBD']	synthesis	: ['NN']
questionable	: ['JJ']	medium	: ['NN']
offering	: ['VBG']	offer	: ['VBP']
simplifications	: ['NNS']	becoming	: ['VBG']
differences	: ['NNS', 'NNP']	failure	: ['NN']
understandable	: ['JJ']	solar	: ['JJ']
streaming	: ['NN']	prevents	: ['VBZ']
model-driven	: ['JJ']	devices	: ['NNS']
economic	: ['JJ', 'NNP']	stages	: ['NNS']
document-to-document	: ['JJ']	proved	: ['VBD', 'VBN']
-rrb-	: ['-RRB-', 'RB']	request	: ['NN', 'VBP']
abstract	: ['JJ']	proven	: ['VBN']
drive	: ['VBP']	''	: ["''"]
exist	: ['VB', 'VBP']	problem-oriented	: ['JJ']
constructed	: ['VBN']	no	: ['DT', 'RB']
generally	: ['RB']	reality	: ['NN']
role	: ['NN']	holding	: ['VBG']
digital	: ['JJ']	warehouse	: ['NN']
developers	: ['NNS']	realize	: ['VB']
node	: ['NN', 'VB']	picture	: ['VBZ']
's	: ['POS']	models	: ['NNS']
sql	: ['NNP']	discharge	: ['NN']

billion	: ['CD']		longer	: ['RB', 'RBR']
together	: ['RP']		time	: ['NN']
n1	: ['NNP']		n2	: ['NNP']
quantity	: ['NN']		concept	: ['NN']
chain	: ['NN']		reviewers	: ['NNS']
global	: ['JJ']		focus	: ['VBP', 'VB']
leads	: ['VBZ', 'NNS']		roy	: ['NNP']
manages	: ['VBZ']		computation	: ['NN']
displaying	: ['VBG']		layers	: ['NNS']
1948	: ['CD']		depend	: ['VB']
condition-action	: ['JJ']		graph	: ['NN']
1944	: ['CD']		1945	: ['CD']
environment	: ['NN', 'NNP']		prolonging	: ['VBG']
discovering	: ['VBG']		analogous	: ['JJ']
advantage	: ['NN']		k.j.holyoak	: ['NNP']
emphasizes	: ['VBZ']		unfamiliar	: ['JJ']
cook	: ['NNP']		join	: ['VB', 'JJ']
exact	: ['JJ']		presented	: ['VBN']
proposals	: ['NNS']		standards	: ['NNS']
item	: ['NN']		science	: ['NN', 'NNP']
community-infrastructure: ['JJ']			unaware	: ['JJ', 'VBG']
upper	: ['JJ']		revolution	: ['NN']
thinkers	: ['NNS']		cyber-infrastructures: ['NNS']	
trend	: ['NN']		dealing	: ['VBG']
discover	: ['VB', 'VBP', 'NNP']		cyber	: ['NN']
unrepresented	: ['JJ']		cost	: ['NN']
shares	: ['VBZ']		uniform	: ['NNP']
current	: ['JJ']		sequential	: ['NNP']
goes	: ['VBZ']		marketing	: ['NN', 'VBG']
relational	: ['JJ']		falling	: ['VBG']
rationalizes	: ['VBZ']		satisfy	: ['VB']
supporting	: ['JJ', 'VBG']		transportation	: ['NN']
meta-cognitive	: ['JJ']		understanding	: ['NN', 'VBG']
water	: ['NN']		upgrade	: ['VB']
groups	: ['NNS']		address	: ['NN', 'VB']
along	: ['IN']		change	: ['VBP', 'NN']
box	: ['NNP']		institute	: ['NNP']
shift	: ['NN', 'VB']		studied	: ['VBN']
commonly	: ['RB']		spheres	: ['NNS']
usually	: ['RB']		resonance	: ['NNP']
conveniently	: ['VB']		studies	: ['VBZ']
genuinely	: ['RB']		emerge	: ['VB']
tasks	: ['NNS']		inference	: ['NN']
perspectives	: ['NNS']		flexibility	: ['NN']
logically	: ['RB']		reinvention	: ['NN']
should	: ['MD']		market	: ['NN']
working	: ['VBG']		prove	: ['VB']
positive	: ['JJ']		predictions	: ['NNS']
hilbert	: ['NNP']		live	: ['VBP']

```
memory            : ['NN']                                 scope             : ['NN']
selects           : ['VBZ']                                theoretical       : ['JJ']
sharing           : ['NN', 'VBG']                          analogical        : ['JJ', 'NN']
outputs           : ['VBZ']                                minsky            : ['NNP']
cases             : ['NNS']                                effort            : ['NN']
capturing         : ['NNP']                                insights          : ['NNS', 'NNPS']
organizations     : ['NNS']                                ibm               : ['NNP']
thousands         : ['NNS']                                flu               : ['NNP', 'NN']
cat               : ['VB', 'NN']                           diverse           : ['JJ']
harmonious        : ['JJ']                                 renders           : ['VBZ']
can               : ['MD', 'VB']                           growing           : ['VBG']
making            : ['VBG']                                petabytes         : ['NNS']
claim             : ['NN']                                 figure            : ['NNP', 'NN']
predict           : ['VB']                                 expanding         : ['VBG']
agent             : ['NN']                                 meta-model        : ['VBZ']
topic             : ['NN', 'VB']                           coincident        : ['JJ']
heckerman         : ['NNP']                                dennis            : ['NNP']
pre-defined       : ['JJ']                                 requirements      : ['NNS']
discussion        : ['NN']                                 fourth            : ['JJ']
divides           : ['VBZ']                                economy           : ['NN']
map               : ['VB', 'VBP', 'NN', 'NNP']             product           : ['NN']
explores          : ['VBZ']                                huge              : ['JJ']
may               : ['MD']                                 applications      : ['NNS']
smoot             : ['NNP']                                designed          : ['VBN']
improving         : ['VBG', 'VB']                          such              : ['JJ', 'PDT']
cradle-to-cradle  : ['JJ']                                 journals          : ['NNS']
grow              : ['VB']                                 man               : ['NN']
natural           : ['JJ']                                 sectors           : ['NNS']
conscious         : ['JJ']                                 explicit          : ['JJ']
so                : ['RB', 'IN', 'CC']                     definitions       : ['NNS']
webpage           : ['NN']                                 indeed            : ['RB']
mainly            : ['RB']                                 years             : ['NNS']
stability         : ['NN']                                 structuring       : ['NNP', 'VBG']
experiments       : ['NNS']                                statistical       : ['JJ']
equip             : ['VB']                                 still             : ['RB']
observational     : ['JJ']                                 derive            : ['VB']
group             : ['NN']                                 how               : ['WRB', 'JJ']
interesting       : ['JJ']                                 jim               : ['NNP']
globalization     : ['NN']                                 coordinates       : ['NNP', 'NN', 'VBZ']
forms             : ['NNS', 'VBZ']                         platform          : ['NN']
www.w3.org/tr/rdf-sparql-query/: ['JJ']                        constitutes         : ['VBZ']
policy            : ['NN']                                 coordinated       : ['VBN']
main              : ['JJ']                                 into              : ['IN']
happened          : ['VBD']                                within            : ['IN']
halt              : ['VB']                                 unveiling         : ['VBG']
views             : ['NNS']                                matches           : ['VBZ']
evolution         : ['NN']                                 records           : ['VBZ']
1950              : ['CD']                                 semiotics         : ['NNS']
not               : ['RB']                                 1958              : ['CD']
```

nor	: ['CC', 'NNP']		rendering	: ['VBG']
cognition	: ['NN', 'JJ', 'NNP']		arrows	: ['NNS']
establishing	: ['NNP', 'VBG', 'JJ']		realistic	: ['JJ']
rethinking	: ['VBG']		domain	: ['NN']
retrieve	: ['VB']		significantly	: ['RB']
classifying	: ['VBG']		abnormal	: ['JJ']
challenges	: ['NNS']		et	: ['NNP', 'CC', 'FW', 'RB']
reorganized	: ['VBN']		predefined	: ['JJ']
emerges	: ['VBZ']		shown	: ['VBN']
space	: ['NN', 'NNP']		profit	: ['NN']
algebra	: ['NN']		increase	: ['VB']
attracted	: ['VBN', 'VBD']		emerged	: ['VBN']
internet	: ['NN']		shows	: ['VBZ']
inevitably	: ['RB']		theory	: ['NN']
semi-autonomous	: ['NNS']		1995	: ['CD']
reber	: ['NNP']		mechanisms	: ['NNS']
possibility	: ['NN']		mapping	: ['NN', 'VBG']
inputting	: ['VBG']		statistics	: ['NNS', 'NNPS']
complicated	: ['VBN', 'JJ']		quits	: ['VBZ']
inductive	: ['JJ']		axioms	: ['NNS']
advance	: ['VB']		derivation	: ['NN']
language	: ['NNP', 'NN']		curation	: ['VB']
programming	: ['NN']		catalog	: ['NN']
motion	: ['NN']		turn	: ['NN']
place	: ['NN']		massive	: ['JJ']
misused	: ['JJ']		neglect	: ['VBZ', 'VB']
first	: ['JJ', 'NNP', 'RB']		origin	: ['NN']
bluemix	: ['NN', 'NNP']		fetched	: ['VBN']
predictive	: ['JJ']		question	: ['NN']
variables	: ['NNS']		symbolic	: ['JJ']
one	: ['CD', 'NN', 'PRP']		directly	: ['RB']
carry	: ['VB']		impossible	: ['JJ']
open	: ['NNP', 'VB', 'JJ']		summarize	: ['VB']
engineer	: ['NN']		fmri	: ['NNS']
city	: ['NN']		given	: ['VBN']
knowledge-processing: ['JJ']			structured	: ['VBN', 'NNP', 'JJ']
indicate	: ['VBP']		man-machine	: ['JJ']
draft	: ['NNP']		cost-effective	: ['JJ']
structures	: ['NNS']		cite	: ['VB']
exploring	: ['NNP', 'VBG']		mining	: ['NN']
mostly	: ['RB']		that	: ['IN', 'WDT', 'DT']
continuous	: ['JJ']		proving	: ['VBG']
accurately	: ['RB']		absorbs	: ['VBZ']
representing	: ['VBG']		than	: ['IN']
specify	: ['VB']		11	: ['CD']
wide	: ['JJ', 'NNP']		13	: ['CD']
12	: ['CD']		15	: ['CD']
14	: ['CD']		16	: ['CD']
require	: ['VBP']		constructionism	: ['NN']

future	: ['JJ']	were	: ['VBD']
bio-symbiosis	: ['NNS', 'JJ']	inferring	: ['VBG']
and	: ['CC', 'NNP', 'VB']	illness	: ['NN']
topics	: ['NNS']	locations	: ['NNS']
generalization	: ['NN']	say	: ['VB', 'VBP']
any	: ['DT']	subsystems	: ['NNS']
cyber-concepts	: ['NNS']	efficient	: ['JJ']
answering	: ['VBG', 'NN', 'VBZ']	ideas	: ['NNS']
sciences	: ['NNS']	ideal	: ['JJ']
potential	: ['JJ']	take	: ['VB']
online	: ['JJ']	converged	: ['JJ']
performance	: ['NN']	multiple	: ['JJ']
trace	: ['VB']	normal	: ['JJ']
price	: ['NN']	keeps	: ['VBZ']
paid	: ['VBN']	donation	: ['NN']
pages	: ['NNS']	adaptability	: ['NN']
especially	: ['RB']	adopt	: ['VB']
implications	: ['NNS']	sale	: ['NN']
managing	: ['VBG', 'NNP']	wittrock	: ['NNP']
dispersed	: ['JJ']	laws	: ['NNS']
german	: ['NNP']	workshops	: ['NNS']
commitments	: ['NNS']	discovered	: ['VBD', 'VBN']
spaces	: ['NNS']	xml	: ['NNP']
slow	: ['JJ']	ratio	: ['NN']
analytic	: ['JJ']	only	: ['RB', 'JJ']
enriched	: ['VBN']	deployed	: ['VBN']
developed	: ['VBN', 'VBD']	boyle	: ['NNP']
get	: ['VB']	infallibly	: ['RB']
mechanization	: ['NN']	resource	: ['NN', 'NNP']
summary	: ['NN']	medias	: ['NNS']
scientist	: ['NN']	mapped	: ['VBN']
where	: ['WRB']	vision	: ['NN']
lenzerini	: ['NNP']	physically	: ['RB']
arouses	: ['VBZ']	connections	: ['NNS']
1921	: ['CD']	1928	: ['CD']
concern	: ['NN', 'VB']	detect	: ['VB', 'VBD']
ways	: ['NNS']	review	: ['VB']
representatives	: ['NNS']	forecast	: ['VB']
enough	: ['JJ']	invokes	: ['VBZ']
between	: ['IN']	geometric	: ['JJ']
reading	: ['VBG', 'NN', 'NNP']	across	: ['IN']
infrastructure	: ['NN']	jobs	: ['NNS']
mature	: ['VB', 'JJ']	originated	: ['VBN']
analyzer	: ['NN']	heterogeneous	: ['JJ']
analyzed	: ['VBN']	cities	: ['NNS']
brahe	: ['NNP']	motivations	: ['NNS', 'VBZ']
acquiring	: ['JJ']	many	: ['JJ']
kosko	: ['NNP']	according	: ['VBG']
enabling	: ['VBG', 'VB']	railway	: ['NN']

```
expression          : ['NN']                among            : ['IN']
key                 : ['NN', 'JJ']          cancer           : ['NNP']
period              : ['NN']                innovations      : ['NNS']
maintained          : ['VBN']               learning         : ['NN', 'VBG']
moreover            : ['RB']                keqiang          : ['NNP']
considering         : ['VBG']               epistemology     : ['NN']
capable             : ['JJ']                analogies        : ['NNS']
computing           : ['NN', 'VBG', 'NNP']  shortening       : ['VBG']
distinguishing      : ['VB']                combined         : ['VBN']
enable              : ['VBP', 'VB']         formed           : ['VBN', 'VBD']
observers           : ['NNS']               observe          : ['VB']
external            : ['JJ']                bayesian         : ['NN']
evidence            : ['NN']                irrelevant       : ['JJ']
those               : ['DT']                case             : ['NN']
developing          : ['VBG']               these            : ['DT']
engineering         : ['NN']                n't              : ['RB']
www.w3.org/tr/owl-features/: ['JJ']             ongoing          : ['JJ']
investigating       : ['VBG']               enriches         : ['VBZ']
conferences         : ['NNS']               eventually       : ['RB']
characteristics     : ['NNS']               middle           : ['JJ']
regularity          : ['NN']                good             : ['JJ']
minds               : ['NNS']               technology       : ['NN']
everyday            : ['NN']                binary           : ['JJ']
different           : ['JJ', 'VBG']         revolutions      : ['NNS']
develop             : ['VB']                author           : ['NN']
same                : ['JJ']                intelligently    : ['RB']
html                : ['NNP']               epistemological  : ['JJ']
http://www.w3.org/tr/html5/: ['NNP']            events           : ['NNS']
generated           : ['VBN', 'JJ']         status           : ['NN']
extended            : ['VBN']               centuries        : ['NNS']
driven              : ['JJ', 'VBN']         running          : ['VBG']
fodor               : ['VB', 'NNP']         changing         : ['VBG', 'JJ']
relies              : ['VBZ', 'NNS']        supports         : ['VBZ']
braher              : ['NNP']               markup           : ['NNP']
locality            : ['JJ', 'NN']          ccp              : ['NNP', 'NN']
without             : ['IN']                solve            : ['VB']
extensible          : ['NNP']               components       : ['NNS']
relied              : ['VBN']               coordinate       : ['JJ', 'VB']
model               : ['NN', 'VB', 'NNP']   dimension        : ['NNP', 'NN']
researchers         : ['NNS']               being            : ['VBG']
money               : ['NN']                actions          : ['NNS']
relevant            : ['JJ']                industry-leading : ['JJ']
differentiation     : ['NN']                speed            : ['NN', 'VB']
guides              : ['VBZ']               captured         : ['VBN']
heuristic           : ['JJ']                death            : ['NN']
thinking            : ['VBG', 'NN', 'NNP']  empiricism       : ['NN']
improvement         : ['NN']                thoughts         : ['NNS']
http://www.imscenter.net: ['NN']                scheduled        : ['VBN']
aspects             : ['NNS', 'JJ']         around           : ['IN']
```

```
marcus              : ['NNP']               read                : ['VB', 'VBN', 'VBP']
papers              : ['NNS']               unveil              : ['VB']
early               : ['JJ']                test                : ['NN', 'VB']
traffic             : ['NN']                symbolism           : ['NN']
world               : ['NNP', 'NN']         aiming              : ['VBG']
identifying         : ['VBG']               suppliers           : ['NNS']
server              : ['NN']                benefit             : ['VB', 'VBP']
either              : ['RB']                output              : ['NN']
specifies           : ['VBZ']               bankruptcies        : ['NNS']
simulator           : ['NN']                loosely             : ['RB']
competition         : ['NN']                shortcoming         : ['NN']
co-constitution     : ['NN']                images              : ['NNS']
organizing          : ['VBG']               matching            : ['VBG', 'NN']
generates           : ['VBZ']               gross               : ['JJ']
dimensions          : ['NNS', 'JJ']         symbiotic           : ['JJ']
critical            : ['JJ']                provides            : ['VBZ']
understandings      : ['NNS', 'VBZ']        refer               : ['VBP']
measuring           : ['NN']                accessing           : ['VBG']
scientific          : ['JJ', 'NNP']         power               : ['NN']
database            : ['NN']                communicate         : ['VB']
leadership          : ['NNP']               computing.evolution : ['NN']
sixty               : ['JJ']                ontology            : ['NNP', 'RB', 'NN']
on                  : ['IN', 'RP']          central             : ['JJ']
origins             : ['NNS']               of                  : ['IN']
industry            : ['NN']                develops            : ['VBZ']
addition            : ['NN']                wolf                : ['NNP']
greatly             : ['RB']                deerwester          : ['NNP']
act                 : ['VB']                discusses           : ['VBZ']
or                  : ['CC']                road                : ['NN']
berger              : ['NNP']               instruments         : ['NNS']
image               : ['NN']                references          : ['NNS']
determine           : ['VBP', 'VB']         einstein            : ['NNP']
valuable            : ['JJ']                mark                : ['NNP']
nowadays            : ['RB']                co-evolves          : ['VBZ']
weight              : ['NN']                area                : ['NN']
removing            : ['JJ']                there               : ['EX']
hey                 : ['NNP', 'JJ']         symbiosis           : ['NNS', 'JJ', 'VBZ']
lot                 : ['NN']                assumes             : ['VBZ']
complete            : ['JJ']                human-data          : ['JJ']
regard              : ['NN']                co-occurrence       : ['JJ']
philosophers        : ['NNS']               land                : ['NN']
implies             : ['VBZ']               technologies        : ['NNS']
with                : ['IN']                fraud               : ['NN']
applying            : ['VBG']               connect             : ['VBP', 'VB']
vehicles            : ['NNS']               videos              : ['FW']
certain             : ['JJ']                citation            : ['NN', 'NNS']
sales               : ['NNS']               general             : ['JJ']
imagination         : ['NN']                as                  : ['IN', 'RB']
reliability         : ['NN']                at                  : ['IN']
```

planets	: ['NNS']		gruber	: ['NNP']
statuses	: ['NNS']		again	: ['RB']
assessing	: ['VBG']		completeness	: ['NNS']
4.0	: ['VBG']		storage	: ['NN']
green	: ['JJ']		field	: ['NN']
mathematics	: ['NNS', 'NN']		collaborative	: ['JJ', 'NNP']
separate	: ['JJ']		students	: ['NNS']
symbol	: ['NN']		wirth	: ['NNP']
deriving	: ['VBG']		hardware	: ['NN']
important	: ['JJ']		psychology	: ['NN']
building	: ['NN', 'VBG']		tiger	: ['NN', 'CD']
impossibility	: ['NN']		mass	: ['JJ']
nelson	: ['NNP']		directory	: ['NNP']
strings	: ['NNS']		represent	: ['VBP', 'VB']
all	: ['DT', 'RB']		semantic	: ['JJ', 'NNP']
forget	: ['JJ']		lack	: ['NN']
browsers	: ['NNS']		generalize	: ['VB']
cooperative	: ['JJ']		follow	: ['VBP']
coauthor	: ['NN']		decisions	: ['NNS']
reasoning	: ['NN', 'VBG', 'JJ']		referring	: ['VBG']
opportunities	: ['NNS']		removal	: ['NN']
to	: ['TO']		foster	: ['NNP']
preserved	: ['VBN']		life-cycle	: ['JJ']
nodes	: ['NNS']		cause-	: ['JJ']
activities	: ['NNS']		very	: ['RB']
domain-specific	: ['JJ']		difference	: ['NN']
condition	: ['NN']		joined	: ['VBN']
intricately	: ['RB']		large	: ['JJ']
contexts	: ['NNS']		adjust	: ['VB']
form	: ['VBP', 'NN', 'VB']		small	: ['JJ']
biological	: ['JJ']		workloads	: ['NNS']
20th	: ['JJ']		broader	: ['JJR']
ten	: ['CD']		self-contained	: ['JJ']
rate	: ['NN']		invention	: ['NN']
design	: ['NN', 'VB']		perspective	: ['NN']
further	: ['RBR', 'RB', 'JJ']		investment	: ['NN']
ghemawat	: ['NNP']		will	: ['MD']
what	: ['WP', 'WDT']		cues	: ['NNS']
consumers	: ['NNS']		sun	: ['NN']
sum	: ['NN']		overload	: ['NN']
,1969	: ['CD']		subspaces	: ['NNS']
scientists	: ['NNS']		learned	: ['VBN']
public	: ['NN', 'NNP', 'JJ']		component	: ['NN']
diapers	: ['NNS']		answers	: ['VBZ', 'NNS']
compose	: ['VB']		operating	: ['VBG']
observing	: ['VBG']		search	: ['NN', 'VB', 'JJ']
nature-inspired	: ['JJ']		provably	: ['RB']
identifiable	: ['JJ']		inspired	: ['VBD', 'VBN']
allows	: ['VBZ']		experience	: ['NN', 'VBP', 'VB']

```
prior                   : ['JJ']                published               : ['VBD', 'VBN']
provable                : ['JJ']                specialize              : ['VB']
inspires                : ['NNS', 'VBZ']        via                     : ['IN']
gick                    : ['NNP']               advocated               : ['VBD']
texts                   : ['NNS']               analyzing               : ['VBG']
aptitude                : ['JJ']                establish               : ['VB']
sensors                 : ['NNS']               select                  : ['VB']
intensive               : ['JJ']                conventional            : ['JJ']
takes                   : ['VBZ']               contains                : ['VBZ']
two                     : ['CD']                bio-inspired            : ['JJ']
compensate              : ['VB']                taken                   : ['VBN']
more                    : ['JJR', 'RBR']        lowering                : ['VBG']
initiated               : ['VBN']               constructs              : ['VBZ']
tested                  : ['VBN']               controlling             : ['VBG']
zhuge                   : ['NNP']               particular              : ['JJ']
known                   : ['VBN']               evolves                 : ['VBZ']
keeping                 : ['VBG']               machine-data-machine: ['JJ']
self-organize           : ['VBP']               coalition               : ['NNP']
categorizing            : ['VBG']               paragraph               : ['NN']
evolved                 : ['VBN']               learn                   : ['VBP', 'VB']
strategies              : ['NNS']               specialized             : ['JJ']
history                 : ['NN']                compare                 : ['VB']
computers               : ['NNS']               impacts                 : ['NNS']
szalay                  : ['JJ']                concept-level           : ['JJ']
share                   : ['VB', 'NN']          human-to-data           : ['NN', 'JJ']
states                  : ['NNPS']              minimum                 : ['JJ']
sense                   : ['NN', 'VBP']         axis                    : ['NNS']
information             : ['NN']                needs                   : ['VBZ']
goal                    : ['NN', 'VB']          rather                  : ['RB']
maps                    : ['VBD']               transfers               : ['VBZ']
http://www.google.org/flutrends/: ['NNP']               influences              : ['NNS', 'VBZ']
explains                : ['VBZ']               plans                   : ['NNS']
communicating           : ['VBG']               derived                 : ['VBN']
orbits                  : ['NNS']               reflect                 : ['VB', 'VBP']
tries                   : ['VBZ']               action-centered         : ['JJ']
human-to-human          : ['NN', 'JJ']          coming                  : ['VBG']
verified                : ['VBN']               queries                 : ['NNS']
lifecycle               : ['NN']                shortcomings            : ['NNS']
brynjolfsson            : ['VB']                mislead                 : ['VB']
discussing              : ['VBG']               fundamental             : ['JJ']
retrieval               : ['NN']                rayport                 : ['NNP']
help                    : ['VB', 'NN', 'VBP']   hierarchy               : ['NN']
essence                 : ['NN']                already                 : ['RB']
through                 : ['IN']                brin                    : ['VB']
its                     : ['PRP$']              24                      : ['CD']
controllable            : ['JJ']                26                      : ['CD']
rapidly                 : ['RB']                economists              : ['NNS']
entscheidungsproblem: ['NNP']                   solving                 : ['VBG']
actually                : ['RB']                verifies                : ['VBZ']
```

```
microscopic      : ['JJ']                      systems          : ['NNS', 'NNPS']
speech           : ['NN']                      fool             : ['NN']
incompleteness   : ['NNS']                     propose          : ['VB']
number           : ['NN']                      framework        : ['NNP', 'NN']
communities      : ['NNS']                     association      : ['NN']
easily           : ['RB']                      document         : ['NN']
fully            : ['RB']                      level            : ['NN']
truths           : ['NNS']                     philosophical    : ['JJ']
capability       : ['NN']                      habits           : ['NNS']
experiencing     : ['VBG']                     self-motivation  : ['NN']
difficult        : ['JJ']                      friendship       : ['NN']
subsystem        : ['NN']                      mental           : ['JJ']
formulate        : ['VB']                      generation       : ['NN']
energy           : ['NN']                      hard             : ['JJ']
reduce           : ['VB']                      idea             : ['NN']
investigated     : ['VBN']                     expect           : ['VB']
measurement      : ['NN']                      loops            : ['NNS']
operation        : ['NN']                      beyond           : ['IN']
event            : ['CD']                      co-constitute    : ['JJ']
initiatives      : ['NNS']                     funding          : ['VBG', 'NN']
missed           : ['VBN']                     conceptualizing  : ['NN']
solved           : ['VBD', 'VBN']              since            : ['IN']
publish          : ['UH']                      research         : ['NN', 'NNP']
health           : ['NN']                      denoted          : ['VBN']
issue            : ['NN']                      causally         : ['RB']
friday           : ['NNP']                     reason           : ['NN']
base             : ['NNP', 'NN']               imaging          : ['NNP', 'NN']
members          : ['NNS']                     generate         : ['VBP', 'VB']
temperature      : ['NN']                      definition       : ['NN']
benefits         : ['NNS']                     rejects          : ['VBZ']
http://hadoop.apache.og: ['VBG']                  neglected        : ['VBN']
major            : ['JJ']                      probability      : ['NN']
al.              : ['NNP', 'NN', 'CD']         reflected        : ['VBN']
preservation     : ['NN']                      linking          : ['VBG', 'VBD', 'CD']
instances        : ['RB', 'NNS']               done             : ['VBN']
neglects         : ['VBZ']                      miss             : ['VB']
stage            : ['NN']                      heads            : ['NNS']
leverage         : ['NN']                      utilization      : ['NN']
introduction     : ['NN']                      leading          : ['JJ']
interact         : ['NN', 'VB', 'VBP']         least            : ['JJS']
assumption       : ['NN']                      statement        : ['NN']
hundred          : ['CD']                      store            : ['VB']
schema           : ['NN']                      shifted          : ['VBN']
relationship     : ['NN']                      newell           : ['NNP']
measurable       : ['JJ']                      part             : ['NN']
authors          : ['NNS']                     inventing        : ['JJ']
translation      : ['NN']                      believe          : ['VB', 'VBP']
clarifying       : ['VBG']                     kind             : ['NN']
molecular        : ['JJ']                      determines       : ['VBZ']
```

```
system-to-system  : ['JJ']                    aims           : ['VBZ', 'NNP', 'NNS']
determined        : ['VBN']                    2020           : ['CD']
risks             : ['VBZ']                    toward         : ['IN']
remembers         : ['VBZ']                    interactive    : ['JJ', 'NNP', 'NN']
deciding          : ['VBG']                    motivation     : ['NN', 'NNS']
higher-level      : ['JJ']                     karl           : ['NNP']
outputting        : ['VBG']                    lie            : ['VB']
nights            : ['NNS']                    built          : ['VBN']
depending         : ['VBG']                    officers       : ['NNS']
extracted         : ['VBN']                    recognizing    : ['VBG']
internal          : ['JJ']                     build          : ['VB']
analogy           : ['NN']                     finding        : ['VBG', 'NN']
analogs           : ['NNS']                    play           : ['VBP', 'VB']
towards           : ['IN']                     electric       : ['JJ']
programmers       : ['NNS']                    serve          : ['VB']
measures          : ['NNS']                    reach          : ['VB']
most              : ['RBS', 'JJS']             experiences    : ['NNS', 'VBZ']
plan              : ['NN']                     significant    : ['JJ']
services          : ['NNS', 'NNPS', 'VBZ']     accepting      : ['VBG']
infrastructures   : ['NNS']                    extremely      : ['RB']
salary            : ['NN']                     unsupervised   : ['JJ']
mobile            : ['JJ']                     arising        : ['JJ', 'VBG']
clear             : ['JJ']                     sometimes      : ['RB']
coincides         : ['VBZ']                    unreasonable   : ['JJ']
traditional       : ['JJ']                     velocity       : ['NN']
physics           : ['NN', 'NNS']              institutions   : ['NNS']
joining           : ['VBG']                    phenomenon     : ['NN']
sparrow           : ['NNP']                    relation       : ['NN']
fine              : ['JJ']                     networks       : ['NNS']
impact            : ['NN']                     indicator      : ['NN', 'NNP']
simulating        : ['VBG', 'VB', 'NNP']       hope           : ['VBP']
distributed       : ['VBN', 'JJ', 'VBD']       failed         : ['VBD']
experiment        : ['NN']                     factor         : ['NN']
his               : ['PRP$']                   dependent      : ['JJ']
externalizes      : ['VBZ']                    rest           : ['NN']
shared            : ['VBN']                    during         : ['IN']
him               : ['PRP']                    deductive      : ['JJ']
data-to-data      : ['VB']                     knowledge-based : ['JJ']
stored            : ['VBN']                    common         : ['JJ']
activity          : ['NN']                     sustainable    : ['NNP', 'JJ']
scanning          : ['VBG', 'NNP']             set            : ['NN', 'VBN']
tree              : ['NN']                     see            : ['VB']
individual        : ['JJ', 'NN']               are            : ['VBP']
close             : ['JJ']                     expertise      : ['NN']
deploying         : ['VBG']                    connectionism  : ['NN']
gravitation       : ['NN']                     threats        : ['NNS']
expert            : ['NN']                     pictures       : ['NNS']
currently         : ['RB']                     rejecting      : ['VBG']
various           : ['JJ']                     conditions     : ['NNS']
```

available	: ['JJ']		creating	: ['VBG']
unconscious	: ['JJ']		missing	: ['VBG']
interfaces	: ['NNS']		attention	: ['NN']
general-purpose	: ['JJ']		distinguish	: ['VB']
both	: ['DT', 'PDT', 'CC']		paradigms	: ['NNS']
improved	: ['VBN']		hyperlink	: ['NN']
became	: ['VBD']		context	: ['NN']
long-term	: ['JJ']		whole	: ['JJ']
finds	: ['VBZ']		experimental	: ['JJ']
millions	: ['NNS']		large-scale	: ['JJ']
reasons	: ['NNS']		loan	: ['NN']
community	: ['NN', 'NNP']		simply	: ['RB']
capabilities	: ['NNS']		upgrades	: ['VBZ']
throughout	: ['IN']		expensive	: ['JJ']
decline	: ['VB', 'NN']		ensures	: ['VBZ']
described	: ['VBD']		raise	: ['VBP', 'VB']
lattice	: ['NN']		create	: ['VBP', 'VB']
human-human	: ['JJ']		due	: ['JJ']
strategy	: ['NN']		johannes	: ['NNP']
ecologists	: ['NNS']		http://www.industrialinternetconsortium.org:
['VBG']				
maintenance	: ['NN']		collected	: ['VBN']
adoption	: ['NN']		extreme	: ['JJ']
treatment	: ['NN']		generating	: ['VBG', 'NNP']
top-down	: ['JJ']		transferring	: ['VBG']
gap	: ['NN']		understand	: ['VB', 'VBP']
demand	: ['NN']		prices	: ['NNS']
unify	: ['VB']		solid	: ['JJ']
reliable	: ['JJ']		empirical	: ['JJ']
technical	: ['JJ']		while	: ['IN']
optimization	: ['NN']		accidently	: ['RB']
evaluating	: ['VBG']		evaluates	: ['VBZ']
designing	: ['VBG']		engineers	: ['NNS']
computed	: ['VBN']		real	: ['JJ']
century	: ['NN']		pylyshyn	: ['VB', 'NNP']
itself	: ['PRP']		estimate	: ['VB']
belong	: ['VBP']		hadoop	: ['NNP']
rules	: ['NNS', 'VB', 'VBZ', 'NNPS']		widely	: ['RB']
grand	: ['JJ']		composition	: ['NN']
higher	: ['JJR']		development	: ['NN']
used	: ['VBN', 'VBD']		undecidable	: ['JJ']
comprehensive	: ['JJ']		flows	: ['VBZ']
domains	: ['NNS']		viewing	: ['VBG']
levels	: ['NNS']		uses	: ['VBZ']
purpose	: ['NN']		necessity	: ['NN']
recent	: ['JJ']		lower	: ['JJR']
task	: ['NN']		surrogate	: ['NN']
globus	: ['NNP']		spent	: ['VBD']
analysis	: ['NN', 'NNP']		person	: ['NN']

```
machinery        : ['NN']                          howe             : ['NNP']
organization     : ['NN']                          things           : ['NNS']
abilities        : ['NNS']                         deployment       : ['NN']
named            : ['VBN']                          1961             : ['CD']
decentralized    : ['JJ', 'VBN']                   questions        : ['NNS']
using            : ['VBG']                          useful           : ['JJ']
addresses        : ['NNS']                         discipline       : ['NN']
tables           : ['NNS']                         accepted         : ['VBN']
relevancy        : ['NN']                          readers          : ['NNS']
guaranteed       : ['VBN']                          representational : ['JJ']
source           : ['NN']                          hyperlinks       : ['NNS']
questioned       : ['VBN']                          theorem          : ['NN']
influencing      : ['VBG']                          transformation   : ['NN']
generalized      : ['VBN']                          ...              : [':']
customers        : ['NNS']                         evaluate         : ['VB']
edvac            : ['NN']                          deepening        : ['VBG']
ecosystems       : ['NNS']                         projects         : ['VBZ']
formal           : ['JJ']                          cognitive        : ['JJ', 'NNP', 'NN', 'VBP']
follows          : ['VBZ']                          signal           : ['NN']
mismatching      : ['NN']                          collect          : ['VBP', 'NN', 'VB', 'JJ']
individuals      : ['NNS']                         reichman         : ['NNP']
popular          : ['JJ']                          essential        : ['JJ']
clustering       : ['NN']                          mathematical     : ['JJ']
ecology          : ['NN']                          often            : ['RB']
meta-computing   : ['JJ']                          some             : ['DT']
understood       : ['VBN']                          trends           : ['NNP']
experienced      : ['VBN', 'VBD']                  accelerate       : ['VB']
gradually        : ['RB']                          scale            : ['NN', 'VB']
describing       : ['VBG']                          broadband        : ['JJ']
decision         : ['NN']                          integration      : ['NN']
cyber-social     : ['JJ']                          connecting       : ['VBG']
innovation       : ['NN']                          forgets          : ['VBZ']
be               : ['VB']                          run              : ['VBN', 'VBP', 'NN', 'VB']
processing       : ['VBG', 'NN', 'NNP']            forming          : ['VBG']
step             : ['NN']                          become           : ['VBN', 'VB']
by               : ['IN']                          usa              : ['NNP']
anything         : ['NN']                          state-of-the-art : ['JJ']
tracing          : ['VBG']                          in-depth         : ['JJ']
simulation       : ['NN']                          consequently     : ['RB']
complementing    : ['VBG']                          computational    : ['JJ']
causation        : ['NN']                          recreate         : ['VB']
nsf              : ['NNP']                          servers          : ['NNS']
appropriate      : ['JJ']                          centrality       : ['NN']
behaving         : ['VBG']                          impressed        : ['VBN']
seger            : ['NNP']                          innate           : ['JJ']
retrieving       : ['VBG']                          probabilistic    : ['JJ']
bargaining       : ['NN']                          long             : ['JJ']
veracity         : ['NN']                          forward          : ['RP']
analyze          : ['VB']                          sections         : ['NNS']
```

transformable	: ['JJ']	criteria	: ['NNS']	
searching	: ['VBG', 'NN']	daily-life	: ['JJ']	
link	: ['VB', 'NN']	externalizing	: ['VBG']	
-lrb-	: ['-LRB-']	raising	: ['VBG']	
consist	: ['VB', 'VBP']	up	: ['RP']	
us	: ['PRP']	maturity	: ['NN']	
exploration	: ['NN']	verification	: ['NN']	
kuhn	: ['NNP']	continuously	: ['RB']	
etc.	: ['FW', 'RB']	called	: ['VBN', 'VBD']	
bell	: ['NNP']	storing	: ['VBG', 'VBZ']	
constant	: ['JJ']	influence	: ['NN', 'VBP', 'VB']	
accessibility	: ['NN']	globally	: ['RB']	
single	: ['JJ']	associates	: ['VBZ']	
organizational	: ['JJ']	neglecting	: ['JJ']	
preventing	: ['VBG']	application	: ['NN']	
priori	: ['VBG', 'JJ']	income	: ['NN']	
intelligence	: ['NN']	arithmetic	: ['NN']	
revision	: ['NN']	explaining	: ['VBG', 'VBD']	
draw	: ['VB']	users	: ['NNS']	
provided	: ['VBN']	machine-data	: ['JJ']	
korf	: ['NNP']	problems	: ['NNS']	
replace	: ['VB']	meaning	: ['NN', 'VBG']	
fisher	: ['NNP']	structure	: ['NN', 'VB']	
correlated	: ['VBN']	methodologies	: ['NNS']	
provenance	: ['NN']	age	: ['NN']	
required	: ['VBN']	departments	: ['NNS']	
human-data-human	: ['JJ']	2003	: ['CD']	
2000	: ['CD']	2001	: ['VBZ', 'CD']	
2006	: ['CD', 'VBZ']	2007	: ['CD']	
2004	: ['CD']	2005	: ['CD']	
2008	: ['CD']	2009	: ['CD', 'VBZ']	
requires	: ['VBZ']	fahey	: ['NNP']	
once	: ['RB']	codd	: ['NNP']	
co-author	: ['NNS']	incorporate	: ['VB']	
results	: ['NNS']	existing	: ['JJ', 'VBG']	
proposition	: ['NN']	meta-cognition	: ['NN']	
go	: ['VBP', 'VB']	query	: ['NN', 'NNP']	
issues	: ['NNS']	copernicus	: ['NNP']	
simon	: ['NNP']	disposal	: ['NN']	
concerned	: ['VBD']	languages	: ['NNS']	
citing	: ['VBG']	helps	: ['VBZ']	
stable	: ['JJ']	include	: ['VBP']	
resources	: ['NNS']	grid	: ['NNP', 'NN']	
facebook	: ['NNP']	categories	: ['NNS']	
timely	: ['JJ']	recreation	: ['NNP']	
transmission	: ['NN']	positions	: ['NNS']	
try	: ['VBP', 'VB']	licklider	: ['NNP']	
someday	: ['RB']	odp	: ['NNP']	
human-computer	: ['VBZ']	sensation	: ['NN']	

```
video              : ['NNP']              makers            : ['NNS']
index              : ['NN']               optimize          : ['VB']
plays              : ['VBZ']              business          : ['NN', 'NNP']
giving             : ['VBG']              han               : ['NNP']
find               : ['VB', 'VBP']        access            : ['VB', 'NN']
19th               : ['JJ']               transmit          : ['VB']
real-world         : ['JJ']               sviokla           : ['NNP']
values             : ['NNS']              focuses           : ['VBZ']
respectively       : ['RB']               pushing           : ['VBG']
delivering         : ['VBG', 'NN']        following         : ['JJ', 'VBG', 'NN']
explore            : ['VB']               objects           : ['NNS', 'NNP']
let                : ['VB']               cyber-physical    : ['JJ', 'NNP']
separation         : ['NN']               others            : ['NNS']
invented           : ['VBN']              implicit          : ['JJ']
deduced            : ['VBN']              great             : ['JJ']
receive            : ['VB']               involved          : ['VBN']
leaving            : ['VBG']              rdf               : ['NNP']
products           : ['NNS']              1937              : ['CD']
makes              : ['VBZ']              involves          : ['VBZ']
examining          : ['VBG']              up-to-date        : ['JJ']
formulated         : ['VBN']              apple             : ['NN']
scales             : ['NNS', 'NNPS']      manage            : ['VB', 'VBP']
names              : ['NNS']              tools             : ['NNS']
causal             : ['JJ']               cloud             : ['NN', 'JJ']
use                : ['NN', 'VBP', 'VB']  refers            : ['VBZ']
from               : ['IN']               hears             : ['VBZ']
consumption        : ['NN']               davisapril        : ['NNP']
next               : ['JJ']               depicted          : ['VBN']
doubt              : ['NN']               reciprocity       : ['JJ', 'NN']
themselves         : ['PRP']              noisy             : ['NN']
reflects           : ['VBZ']              deepest           : ['JJS']
optimizing         : ['VBG']              formally          : ['RB']
mismatch           : ['NN']               cooperate         : ['VB']
carrying           : ['VBG']              popper            : ['NNP']
carried            : ['VBN']              customer          : ['NN']
isomorphism        : ['NN']               integrating       : ['VBG']
this               : ['DT']               challenge         : ['NN']
when               : ['WRB']              obvious           : ['JJ']
publications       : ['NNS']              industrial        : ['JJ', 'NNP']
meet               : ['VB']               closing           : ['VBG']
document-to-human  : ['JJ']               proof             : ['NN']
control            : ['NN']               e.g.              : ['NNP', 'UH', 'RB', 'VBG', 'VBD', 'VB', 'VBP', 'NN',
'VBN', 'JJ']
process            : ['VB', 'NN', 'VBP']  tax               : ['NN']
high               : ['JJ']               effectively       : ['RB']
assumptions        : ['NNS']              unlimitedly       : ['RB']
united             : ['NNP']              varied            : ['VBN']
six                : ['CD']               regions           : ['NNS']
located            : ['VBN']              service-oriented  : ['JJ']
```

```
establishment      : ['NN']                    stock             : ['NN']
normalize          : ['VB']                    blocks            : ['NNS']
g?del              : ['NNP']                   philosophy        : ['NN']
collection         : ['NN']                    distances         : ['NNS']
monitoring         : ['NN']                    mid-term          : ['JJ', 'NN']
https://translate.google.com: ['NNP']              induction          : ['NN']
physical           : ['JJ']                    bind              : ['NN']
scans              : ['VBZ']                   dhar              : ['NNP']
object-oriented    : ['JJ']                    chief             : ['JJ']
metaphors          : ['NNS']                   allow             : ['VB']
move               : ['VB']                    symbols           : ['NNS']
including          : ['VBG']                   methods           : ['NNS']
facilitates        : ['VBZ']                   write             : ['VBP']
multi-dimensional  : ['JJ']                    relativity        : ['NN']
varies             : ['VBZ']                   estimating        : ['VBG']
tenenbaum          : ['NNP']                   communication     : ['NN']
2015               : ['VBZ']                   2014              : ['CD']
2011               : ['CD', 'JJ']              2010              : ['CD']
2013               : ['CD']                    2012              : ['CD', 'VBZ']
descriptive        : ['JJ']                    practice          : ['NN', 'NNP']
indexing           : ['VBG', 'NN', 'VBZ']      resolve           : ['VB']
day                : ['NN']                    worlds            : ['NNS']
profound           : ['JJ']                    verifying         : ['VBG']
intelligent        : ['JJ', 'NNP']             identified        : ['VBN']
accompanies        : ['VBZ']                   pathway           : ['NN']
sufficiently       : ['RB']                    transmitted       : ['VBN']
truth              : ['NN']                    l1                : ['NNP']
identifies         : ['VBZ']                   constraints       : ['NNS']
subset             : ['NN']                    co-evolve         : ['VB', 'NN', 'VBP']
doing              : ['VBG']                   falsifiability    : ['JJ']
related            : ['VBN', 'JJ']             constitute        : ['VBP', 'VB']
society            : ['NN', 'NNP']             frequency         : ['NN']
static             : ['JJ']                    separating        : ['NNP', 'VBG']
human-level        : ['JJ']                    special           : ['JJ']
out                : ['RP']                    category          : ['NN']
mediates           : ['VBZ']                   frontier          : ['NN']
integrates         : ['VBZ']                   astronomy         : ['NN']
memex              : ['NNP', 'NN']             posteriori        : ['NNS', 'JJ']
dominated          : ['VBN']                   adaptive          : ['JJ']
cause              : ['NN']                    integrated        : ['JJ']
achievements       : ['NNS']                   high-tech         : ['JJ']
high-performance   : ['JJ']                    interactions      : ['NNS', 'FW']
completely         : ['RB']                    networking        : ['NN']
hubble             : ['NNP']                   interaction       : ['NN', 'NNP', 'VBP']
geometry           : ['VBN']                   cause-effect      : ['JJ', 'NN']
could              : ['MD']                    times             : ['NNS']
4th                : ['JJ']                    davis             : ['NNP']
explored           : ['VBN']                   retail            : ['JJ']
facilitate         : ['VB', 'VBP']             housing           : ['NN']
```

powerful	: ['JJ']	reaches	: ['VBZ']
strategic	: ['JJ']	proposing	: ['VBG']
representations	: ['NNS', 'NNP']	precisely	: ['RB']
quality	: ['NN']	synthesizing	: ['JJ', 'VBG']
management	: ['NN', 'NNP']	monkey	: ['NN']
practitioners	: ['NNS']	data	: ['NN', 'NNS', 'NNP', 'VBG']
system	: ['NN', 'NNP']	adopted	: ['VBN', 'VBD']
their	: ['PRP$']	cabig	: ['NN']
efficiently	: ['RB', 'VB', 'NNS']	branches	: ['NNS']
low	: ['JJ']	interests	: ['NNS']
accompany	: ['VB']	explanation	: ['NN']
environmental	: ['JJ']	regards	: ['VBZ']
simulate	: ['VB', 'JJ']	fuzzy	: ['NNP']
policeman	: ['NN']	colleagues	: ['NNS']
richer	: ['JJR']	patients	: ['NNS']
kleinberg	: ['NNP']	providing	: ['VBG']
distinguished	: ['VBN', 'JJ']	result	: ['NN']
behaviors	: ['NNS', 'JJ']	false	: ['JJ']
shrinks	: ['VBZ']	fluctuation	: ['NN']
kepler	: ['NNP']	have	: ['VBP', 'VB']
need	: ['VBP', 'VB', 'NN']	element	: ['NN']
border	: ['NN']	clearly	: ['RB']
viewed	: ['VBN']	documents	: ['NNS']
newtonian	: ['NNP']	able	: ['JJ']
mechanism	: ['NN']	jacobson	: ['NNP']
instance	: ['NN']	concerns	: ['VBZ', 'NNS']
best	: ['JJS']	grounding	: ['NN']
pursues	: ['VBZ']	accuracy	: ['NN']
misunas	: ['NNP']	axiomatic	: ['JJ']
deploy	: ['VB']	who	: ['WP']
intentions	: ['NNS']	propagate	: ['VB']
representation	: ['NN', 'NNP', 'VB', 'JJ']	why	: ['WRB']
reduces	: ['VBZ']	url	: ['VBG', 'NNS', 'NNP']
stronger	: ['JJR']	databases	: ['NNS']
fact	: ['NN']	gain	: ['VB']
impression	: ['NN']	emerging	: ['VBG', 'VB']
selection	: ['NN']	text	: ['NN']
agreed	: ['JJ']	bring	: ['VB']
planning	: ['VBG', 'NN']	portfolio	: ['NN']
high-level	: ['JJ']	debate	: ['NN']
inspiring	: ['NN', 'JJ', 'VBG']	based	: ['VBN']
knowledge	: ['NN', 'VB', 'RB', 'VBP', 'NNP', 'JJ']operational	: ['JJ']
candidates	: ['NNS']	local	: ['JJ']
hall	: ['NNP']	insight	: ['NN', 'JJ']
means	: ['NN']	familiar	: ['JJ']
words	: ['NNS']	coordinating	: ['VBG', 'VB']
compute	: ['VB']	shaping	: ['VBG']
areas	: ['NNS']	queried	: ['VBN']
gray	: ['NNP']	processes	: ['VBZ', 'NNS']

brain	: ['JJ', 'NN']	influenced	: ['VBN']	
processed	: ['VBN']	contain	: ['VB']	
shi	: ['NNP']	cycles	: ['NNS']	
view	: ['NN']	knowing	: ['VBG']	
requirement	: ['NN']	constructing	: ['VBG']	
exists	: ['VBZ']	acquired	: ['VBN']	
national	: ['NNP']	correlations	: ['NNS']	
humans	: ['NNS']	operates	: ['VBZ']	
computer	: ['NN', 'NNP']	enhanced	: ['VBN']	
operated	: ['VBN']	interview	: ['VB']	
interacting	: ['VBG']	berners-lee	: ['NNP']	
pattern	: ['NN']	laureate	: ['NN']	
use-cases	: ['NNP', 'NNS']	incorporating	: ['VBG', 'NNP', 'JJ']	
tend	: ['VBP']	difficulties	: ['NNS']	
closed	: ['VBN']	crude	: ['JJ']	
progress	: ['NN']	neither	: ['RB', 'CC', 'DT']	
george	: ['NNP']	ability	: ['NN']	
importance	: ['NN']	tolman	: ['NNP']	
prediction	: ['NN']	efficiency	: ['NN']	
summarization	: ['NN', 'NNS']	middle-level	: ['JJ']	
demonstrate	: ['VB']	precious	: ['JJ']	
problem	: ['NN']	commenting	: ['NN', 'NNP']	
2002	: ['CD']	limits	: ['VBZ']	
tf-idf	: ['NNP']	attributed	: ['VBN']	
machine-to-machine	: ['NN']	citations	: ['NNS']	
streams	: ['NN', 'NNS']	tactical	: ['JJ']	
attributes	: ['NNS', 'NNP']	estimation	: ['NN']	
fayyad	: ['NNP']	otherwise	: ['RB']	
comment	: ['NN']	unclear	: ['JJ']	
environments	: ['NNS']	adding	: ['VBG']	
maximize	: ['VB']	table	: ['NN', 'NNP']	
unclean	: ['JJ']	i.e.	: ['NNP', 'FW']	
tremendous	: ['JJ']	trajectory	: ['NN']	
challenged	: ['VBN', 'VBD']	indicators	: ['NNS']	
proposal	: ['NN']	waste	: ['NN']	
ontologies	: ['NNS']	define	: ['VB']	
suggested	: ['VBN', 'VBD']	senses	: ['NNS']	
corresponding	: ['JJ']	coherence	: ['NN']	
bachman	: ['NNP']	tycho	: ['NNP']	
al	: ['NNP']	clusters	: ['NNS']	
an	: ['DT']	splits	: ['VBZ']	
dataflow	: ['JJ']	harder	: ['JJR']	
examine	: ['VB', 'VBP']	value	: ['NN', 'NNP']	
promotes	: ['VBZ']	internet-of	: ['NNP']	
revisited	: ['VBN']	discoveries	: ['NNS']	
supply	: ['NN']	layer	: ['NN']	
almost	: ['RB']	blood	: ['NN']	
thus	: ['RB']	linkedin	: ['NNP']	
helped	: ['VBN']	examined	: ['VBN']	

```
dual                   : ['JJ']                      greater             : ['JJR']
capture                : ['VB', 'NN']                productivity        : ['NN']
disparate              : ['JJ']                      administration      : ['NN']
parts                  : ['NNS']                     units               : ['NNS']
finite                 : ['JJ']                      planned             : ['VBN']
material               : ['NN']                      unconventional      : ['JJ']
mathematic             : ['JJ']                      iot                 : ['NNP']
effect                 : ['NN']                      transformational    : ['JJ']
architectures          : ['NNS']                     judgment            : ['NN']
contribution           : ['NN']                      expand              : ['VBP', 'VB']
keep                   : ['VB']                      reflection          : ['NN']
http://www.ibm.com/cloud-computing/bluemix/: ['NNP']                modeled             :
['VBN']
well                   : ['RB']                      thought             : ['VBD', 'NN']
patterns               : ['NNS']                     sets                : ['NNS']
user-friendly          : ['JJ']                      sensing             : ['VBG']
stores                 : ['NNS']                     heavily             : ['RB']
hybrid                 : ['NN']                      accurate            : ['JJ']
half                   : ['DT']                      domestic            : ['JJ']
obtain                 : ['VB']                      sources             : ['NNS']
underlying             : ['VBG', 'RB']               localize            : ['VB']
macroscopic            : ['JJ']                      coordination        : ['NN']
low-level              : ['JJ']                      inmon               : ['NNP']
web                    : ['JJ', 'NNP', 'NN']         rapid               : ['JJ']
e-science              : ['JJ', 'NN']                point               : ['NN']
recommending           : ['VBG']                     discuss             : ['VB']
simple                 : ['NN', 'JJ']                extends             : ['VBZ']
maintaining            : ['VBG']                     propositions        : ['NNS', 'MD']
usage                  : ['VBP']                     close-loop          : ['JJ']
smart                  : ['JJ', 'NNP']               government          : ['NN']
decidable              : ['JJ']                      five                : ['CD']
know                   : ['VB', 'VBP']               supervise           : ['VBP']
variants               : ['NNS']                     necessary           : ['JJ']
like                   : ['IN', 'VBP']               crawled             : ['VBD', 'JJ']
agents                 : ['NNS']                     works               : ['NNS', 'VBZ']
page                   : ['VB']                      regardless          : ['RB']
accessible             : ['JJ']                      because             : ['IN']
foreseeable            : ['VBG']                     twitter             : ['NNP']
church                 : ['NNP']                     phenomena           : ['NNS']
thief                  : ['NN']                      library             : ['NN']
growth                 : ['NN']                      recommendation      : ['NN']
employment             : ['NN']                      recognition         : ['NN']
projection             : ['NN']                      lead                : ['VBP', 'VB']
merge                  : ['VB']                      broad               : ['JJ']
avoid                  : ['VB']                      does                : ['VBZ']
l2                     : ['NNP']                     demonstrated        : ['VBN']
locate                 : ['VB']                      biology             : ['NN']
inaccurate             : ['JJ']                      selecting           : ['VBG']
expansion              : ['NN']                      self-organization   : ['NN']
```

paper	: ['NN']		although	: ['IN']
includes	: ['VBZ']		allenby	: ['NNP']
publishing	: ['NN']		about	: ['IN', 'RB']
behavior-centered	: ['JJ']		extension	: ['NN']
getting	: ['VBG']		universe	: ['NN']
recognized	: ['VBN']		surge	: ['NN']
carries	: ['VBZ']		multi-disciplinary	: ['JJ', 'NN']
software	: ['NN']		converging	: ['VBG']
owl	: ['NNP']		own	: ['JJ']
zooms	: ['VBZ']		assess	: ['VB']
roads	: ['NNS']		goal-oriented	: ['VBN']
utility	: ['NN']		1986	: ['CD']
1985	: ['CD']		1982	: ['CD']
1983	: ['CD']		1980	: ['CD']
1981	: ['CD']		transfer	: ['NN']
justifying	: ['VBG']		support	: ['VB', 'VBP', 'NN']
soil	: ['NN']		spiral	: ['NN']
1988	: ['CD']		1989	: ['NNP', 'CD']
intention	: ['NN']		fuses	: ['VBZ']
human-to-nature	: ['NN']		biggest	: ['JJS']
mappings	: ['NNS']		naturally	: ['RB']
function	: ['NN']		real-time	: ['JJ', 'NNP']
but	: ['CC']		volume	: ['NN']
repeated	: ['VBN']		construction	: ['NN']
goals	: ['NNS']		question-answering	: ['NN']
eat	: ['VB']		he	: ['PRP']
also	: ['RB']		made	: ['VBN']
wise	: ['JJ']		whether	: ['IN']
ecosystem	: ['NN']		record	: ['VB']
lagging	: ['VBG']		computable	: ['JJ', 'NN']
distribution	: ['NNS', 'NN']		display	: ['VB']
strengthens	: ['VBZ']		mechanics	: ['NNS']
links	: ['NNS', 'VBZ']		recognize	: ['VB']
universal	: ['JJ']		contribute	: ['VBP', 'VB']
meaningless	: ['JJ']		slowing	: ['VBG']
combine	: ['VB']		webpages	: ['NNS']
reflecting	: ['VBG']		education	: ['NN']
functions	: ['NNS']		compared	: ['VBN', 'VBD']
variety	: ['NN']		detail	: ['NN']
virtual	: ['JJ']		old	: ['JJ']
other	: ['JJ']		conclusion	: ['NN']
kinds	: ['NNS']		diagnosis	: ['NN']
class	: ['NN']		ultimately	: ['RB']
pathways	: ['NNS']		enterprises	: ['NNS']
inspiration	: ['NN']		ranks	: ['NNS']
factors	: ['NNS']		persistent	: ['JJ']
rule	: ['NN']		volumes	: ['NNS']
indirectly	: ['RB']			