

IR Assignment 2

Report

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Index Building

Version 1 (Uncompressed):

In this assignment, the preprocessed tokens are lemmatized and a dictionary is built using the lemmatized tokens with removal of stopwords.

For dictionary,

The index is a term

And the value is an object `InvertedIndexEntryValue` which contains information on Document frequency, term frequency, postings list and term frequency list.

The dictionary is serialized into a file `Index_version1.uncompress`.

Version1 (compressed):

The dictionary is compressed using 8 block compression technique. All the terms of the dictionary are converted into a single string and accordingly, the document frequency, term frequency and the gaps in the postings list are encoded into gamma code.

This compressed dictionary is serialized into a file `Index_version1.compressed`.

Version 2 (Uncompressed)

In this section, the preprocessed tokens are stemmed and a dictionary is build using the stemmed tokens with no stop words.

Dictionary structure,

Index – stem token

Value of Index – An object `InvertedIndexEntryValue` which contains information on Document frequency, term frequency, postings list and term frequency list.

The dictionary is serialized into a file `Index_version2.uncompress`.

Version2 (compressed):

The dictionary is compressed using 1 block compression technique with front coding of the terms. The prefixes of each and every term are computed accordingly and they are stored in a single string and accordingly, the document frequency, term frequency and the gaps in the postings list are encoded into delta code.

This compressed dictionary is serialized into a file `Index_version1.compressed`.

Results:

```
Enter the directory with full absolute path
C:\Users\RahulAravind\workspace\java\IR_Assignment2\Dataset
*****
Tokenization process initiated.....
Tokenization process completed.....

Time taken for tokenization process: 5657 ms

*****
*****
Lemmatization process initiated.....
Lemmatization process completed.....

Time taken for lemmatization process: 7914 ms

*****
*****
Uncompressed Inverted Index version 1 construction 1
initiated.....
Uncompressed Inverted Index construction process completed.....

Time taken for Uncompressed Index construction (uncompressed and compressed):
1379 ms

*****
*****
Compressed Inverted Index version 1 construction 1 initiated.....

UnCompressed version 1: Term: boundary->
Term frequency: 1185
Document frequency: 467
InvertedList Size in Bytes: 5632

Compressed version 1: Term: boundary->
Term frequency: 1185
Document frequency: 467
InvertedList Size in Bytes: 2056

UnCompressed version 1: Term: flow->
Term frequency: 2079
Document frequency: 730
InvertedList Size in Bytes: 8784
```

Compressed version 1: Term: flow->
Term frequency: 2079
Document frequency: 730
InvertedList Size in Bytes: 3122

UnCompressed version 1: Term: nasa->
Term frequency: 148
Document frequency: 145
InvertedList Size in Bytes: 1764

Compressed version 1: Term: nasa->
Term frequency: 148
Document frequency: 145
InvertedList Size in Bytes: 674

NASA statistics

DocId: 53 Term Freq 1 Doclen: 211 Max_Tf: 14
DocId: 58 Term Freq 1 Doclen: 172 Max_Tf: 14
DocId: 68 Term Freq 1 Doclen: 114 Max_Tf: 7

UnCompressed version 1: Term: prandtl->
Term frequency: 80
Document frequency: 63
InvertedList Size in Bytes: 783

Compressed version 1: Term: prandtl->
Term frequency: 80
Document frequency: 63
InvertedList Size in Bytes: 333

UnCompressed version 1: Term: pressure->
Term frequency: 1354
Document frequency: 541
InvertedList Size in Bytes: 6520

Compressed version 1: Term: pressure->
Term frequency: 1354
Document frequency: 541
InvertedList Size in Bytes: 2368

UnCompressed version 1: Term: reynold->
Term frequency: 384
Document frequency: 200
InvertedList Size in Bytes: 2427

Compressed version 1: Term: reynold->
Term frequency: 384
Document frequency: 200
InvertedList Size in Bytes: 938

UnCompressed version 1: Term: shock->
Term frequency: 737
Document frequency: 239
InvertedList Size in Bytes: 2893

Compressed version 1: Term: shock->

Term frequency: 737
Document frequency: 239
InvertedList Size in Bytes: 1096
Compressed Inverted Index construction version 1 process
completed.....

Time taken for Compressed Index version 1 construction : 2189 ms

Stemming process initiated.....
Stemming process completed.....
Time taken for Stemming: 120 ms

Uncompressed Inverted Index version 2 construction initiated.....
Uncompressed Inverted Index version 2 construction process
completed.....

Time taken for Uncompressed Index version 2 construction: 1196 ms

Compressed Inverted Index version 2 construction initiated.....

UnCompressed version 2: Term: boundari->
Term frequency: 1185
Document frequency: 467
InvertedList Size in Bytes: 5632

Compressed version 2: Term: boundari->
Term frequency: 1185
Document frequency: 467
InvertedList Size in Bytes: 2077

UnCompressed version 2: Term: flow->
Term frequency: 2079
Document frequency: 730
InvertedList Size in Bytes: 8784

Compressed version 2: Term: flow->
Term frequency: 2079
Document frequency: 730
InvertedList Size in Bytes: 3147

UnCompressed version 2: Term: nasa->
Term frequency: 148
Document frequency: 145
InvertedList Size in Bytes: 1764

Compressed version 2: Term: nasa->
Term frequency: 148
Document frequency: 145
InvertedList Size in Bytes: 677

NASA statistics
DocId: 53 Term Freq 1 Doclen: 211 Max_Tf: 14

DocId: 58 Term Freq 1 Doclen: 172 Max_Tf: 14
DocId: 68 Term Freq 1 Doclen: 114 Max_Tf: 6

UnCompressed version 2: Term: prandtl->
Term frequency: 80
Document frequency: 63
InvertedList Size in Bytes: 783

Compressed version 2: Term: prandtl->
Term frequency: 80
Document frequency: 63
InvertedList Size in Bytes: 333

UnCompressed version 2: Term: pressur->
Term frequency: 1382
Document frequency: 551
InvertedList Size in Bytes: 6639

Compressed version 2: Term: pressur->
Term frequency: 1382
Document frequency: 551
InvertedList Size in Bytes: 2431

UnCompressed version 2: Term: reynold->
Term frequency: 384
Document frequency: 200
InvertedList Size in Bytes: 2427

Compressed version 2: Term: reynold->
Term frequency: 384
Document frequency: 200
InvertedList Size in Bytes: 950

UnCompressed version 2: Term: shock->
Term frequency: 737
Document frequency: 239
InvertedList Size in Bytes: 2893

Compressed version 2: Term: shock->
Term frequency: 737
Document frequency: 239
InvertedList Size in Bytes: 1105

Compressed Inverted Index construction version 2 process completed

Time taken for Compressed Index version 2 construction : 1383 ms

Index size (Version 1 uncompressed) in bytes 2316122
Index size (Version 1 compressed) in bytes 1067570
Index size (Version 2 uncompressed) in bytes 2259235
Index size (Version 2 compressed) in bytes 1054034

Total Time for Index building: 19849 ms

Max DF and Min DF in version 1
Term with max document frequency
Document Frequency: 730

Term(s):

[flow]

Term with min document frequency
Document Frequency: 1

Term(s):

[0.000, 0.002, 0.003, 0.004, 0.00675, 0.010, 0.012, 0.013, 0.014, 0.02025,
0.025, 0.028, 0.03, 0.04, 0.06, 0.066, 0.08, 0.0904, 0.11, 0.117, 0.120,
0.13, 0.1428, 0.16, 0.18, 0.182, 0.1875, 0.19, 0.195, 0.199, 0.21, 0.211,
0.22, 0.25, 0.254, 0.262, 0.30, 0.32, 0.33, 0.36, 0.367, 0.368, 0.38, 0.42,
0.43, 0.44, 0.46, 0.500, 0.55, 0.57, 0.58, 0.62, 0.635, 0.69, 0.715, 0.72,
0.725, 0.737, 0.741, 0.76, 0.80, 0.800, 0.805, 0.823, 0.825, 0.84, 0.840,
0.854, 0.90, 0.952, 0.96, 0.98, 000degree, 000efficient, 000k, 1.064, 1.07,
1.08, 1.09, 1.11, 1.17, 1.23849, 1.24, 1.27, 1.400, 1.43, 1.45, 1.450, 1.46,
1.479, 1.48, 1.50, 1.52, 1.55, 1.58, 1.60, 1.61, 1.67, 1.71, 1.72, 1.74,
1.747, 1.77, 1.78, 1.81, 1.82, 1.85, 1.91, 1.92, 1.94, 1.944, 1.96, 1.98,
10.3, 10.5, 100degree, 100x10, 109placement, 10g, 10th, 11.2, 11.60, 11.7,
11.78, 1103a, 12.0, 12.4, 124.9, 12degree, 13.1, 13.5, 13.8, 1400degreek,
14in, 15.4, 1591, 15x10, 16.6, 17.5, 180degree, 18degree, 18in, 1degree, 1fa,
1x10, 2.00, 2.05, 2.06, 2.1, 2.13, 2.15, 2.18, 2.20, 2.24, 2.25, 2.38, 2.4,
2.41, 2.425, 2.45, 2.47, 2.49, 2.6, 2.67, 2.78, 2.80, 2.86, 2.87, 2.9, 2.96,
2.99, 200degree, 20degreec, 24, 25.1, 26.6, 28.59, 29.5, 29.70, 2by, 2n, 2nd,
2p, 2x10, 3.00, 3.04, 3.07, 3.11, 3.13, 3.15, 3.25, 3.3, 3.392, 3.4, 3.44,
3.50, 3.53, 3.55, 3.6, 3.72, 3.74, 3.81, 3.86, 3.899, 3000degreek,
300degreer, 30th, 31.75, 32pp, 34.5, 3600degreek, 4.2, 4.24, 4.36, 4.54,
4.60, 4.65, 4.76, 4.981, 400degree, 40degree, 446j, 49degree, 4ft, 4th, 4x10,
5.04, 5.7, 5.73, 500degree, 55.6, 55degree, 57d19a, 58.1, 58l, 58w, 59a, 5d,
6.00, 6.2, 6.25, 6.28, 6.3, 6.4, 6.9, 6.98, 6000degreek, 63a2xx, 63a4xx,
64a010, 65a004, 65degree, 67.6, 6in, 6th, 7.08, 7.30, 7.35, 7.41, 7.66, 7.7,
7.8, 7.95, 707a, 75, 75degree, 79.5, 7a, 7c, 8.0, 8.238, 8.6, 8.60,
800degree, 81e, 85.5, 85degree, 88.8, 8n, 8x10, 9.0, 9.17, 9.2, 9.5, 9.758,
9.9, 99degree, I, a.a, a.e, a.g, a.r, a0, a2, a252, a50f06, a51j04, a52b06,
a55c08, a55c23, a56b15, ab, abbott, abbreviated, ablatedlength, ablative,
abovementioned, absent, abundantly, accelerometer, accentuate, acceptability,
acceptably, acceptance, accessible, accidental, accountable, accounting,
accrue, accumulate, acetate, achievable, acoust, acoustically, acquisition,
acr, acrodynamic, acrothermochemistry, acrothermoelasticity, actural,
adamson, adaptable, additive, ade, adjacentequilibrium, adjoining, adjoint,
admixture, adsorption, advent, aeolotropic, aerelastic, aerfoil, aerial,
aero.res, aeroballistic, aerocosmonautic, aerodynamicheate, aerodynamieist,
aeroelastician, aeronautique, aerothermal, aerothermochemical,
aerothermodynamic, aerothermoelastic, affinely, affinity, affirmative, afftc,
afresh, afterburner, afterflow, age, agency, agrawal, ailcron, airborne,
aircrafttype, airforce, airliner, airload, airscrew, akin, all029, alan,
algrantus, align, alksne, allcock, allmovable, allround, allude, alternately,
alternatively, altogether, amer, amongst, ample, amplifier, amply,
analogously, analogous, analyser, analytically, analyzable, analyzer,
anastasio, andland, angele, anh, anhedral, anideal, anisotropy, ann, annex,
anniv, announce, annual, annul, anove, anthony, anti, antielastic,
antisymmetric, antisymmetrical, anyway, aob, apogee, app.mech, apparentmass,
appraisal, appraise, appraisalment, appraoch, approx, appropriate, aquart,
arbor, arch, ardc, aren, arithmetic, arithmetical, armstrong, arrest, arrow,
arsj, ary, ascribe, ashley, ashwell, aside, asimplify, ask, aspectratio,
assembly, assert, assistance, association, assortment, assure, astro,
astronautics, astrophy, astrophysics, atabeck, atlarge, atosphere, attaindd,

attainment, atten, attract, audio, aural, auspices, authority, availability, avaluate, avove, avro, ax, axialthrust, ayre, b.e, b.j, b.m, b.o, backing, backup, backward, bakanov, balanced, balsa, ban, bang, barber, bare, barmby, baron, barrel, barry, bartle, basetype, baughman, bc, bearing, beasley, beat, beckett, bed, beg, being, belief, belleville, bellman, belltype, belt, bendict, bendingtorsion, benser, bent, benton, beograd, ber, berger, bergle, bergmann, berlot, bernard, berndt, berner, bernoulli, berthelot, beskin, beta, bethpage, bevel, beyween, bifurcate, bifurcation, bijlaard, billow, bimetallic, bimolecular, birchall, birnbaum, bisector, bisplinghoff, blackie, blackstock, bland, bleich, blended, blessing, blowout, bloxson, blue, bluish, blunttrail, bo, board, boat, bobbitt, bodt, boiloff, boison, bolshakov, bolz, bomb, bonus, boost, borchner, bornel, bounary, boundwell, boxall, boyd, boyer, bracalente, bracket, branchline, brandmaier, bratt, braunschweig, breguet, breckman, brevoort, brightness, bristol, britton, broadbent, broadwell, bromm, brother, brower, browne, bruch, brush, bryce, bryer, bryson, buildup, bulent, bulge, bulkhead, bullen, bullet, bump, buoyancy, burgraf, burke, burton, bury, butler, buzz, bypass, c.a, c.h, c.k, c.o, c.r, c.s, c.w, c0, cabin, calcualt, calcualtion, caliber, callaghan, callahan, cam.phil, camac, camb, camera, canard, cancellation, cant, capillary, capsule, caravelle, carbide, carborundum, card, carderock, cardullo, caret, carro, casaccio, cast, castigliano, castile, castolite, catalytic, catalytically, cater, catherall, cathode, caution, cavitate, cellulose, centaur, centerof, centigrade, centreline, centripetal, centroid, certainty, ceuler, cf, chain, chalre, chann, chap, characteristy, charczenko, charter, chase, chaudhury, chemisorption, chen, chesky, chester, chien, child, chilver, ching, chinitz, chinneck, choleski, chou, chow, chrichlow, christiaen, christian, circuit, circuitry, circumlunar, city, clamshell, classic, classically, classificaiton, classify, clause, clausen, clean, clearance, climinate, clinton, clippinger, closeness, closest, closure, clouston, clutter, co2, coalescence, coarse, coast, coating, coe, coeistant, coherent, colder, coleman, collaboration, collaborator, collectively, collocation, colour, colston, columnmaterial, combustionheate, combution, command, commence, commercially, communication, comp, companion, compatible, compete, competition, complimentary, compound, compressibleflow, compressional, compressors.dash, comput, conceivable, conceivably, concise, concisely, concoct, concrete, concurrently, condamp, condensed, conductioncontroll, conductionexpansion, conductor, conf, confidence, conformally, conformaltransformation, conformity, congr, conical.dash, conically, conidtion, connexion, connor, compressibility, conservativeness, consierable, consolidate, constancy, constantdensity, constantinescu, constantino, constantly, constitution, consult, consultant, consumption, contemplate, contents, context, conti, continually, contract, contracting, contradiction, controller, convair, conveniently, convergentdivergent, converse, conviction, convolution, cooksey, cooler, cooper, coordinator, cope, copper, corollary, corp, corpuscular, corrective, correctness, correlograms, cortright, cosine, cosmonautic, coulomb, coundary, count, counteract, counterclockwise, coupon, cowling, cp115, cp213, cp271, cp394, craft, crandal, crandall, creager, crease, creepbuckle, crest, crew, crewe, crinoline, criticism, criticize, crooked, crosscorrelation, crushed, csanady, cubbison, culebra, cum, cumbersome, cure, curl, curran, currie, curtain, curtis, cuss, cutoff, cx, cylinderhemisphere, cylindrical, d.and, d.b, d.d, d.f, d.g, d.h, d1299, d704, daiber, daley, dalton, damaging, dampometer, dana, danger, dangerous, dashn, dashthat, dashthe, daughaday, davis, daytime, debatable, dec, decade, decidedly, decision, decisively, declassify, decline, decompose, decomposition, deducted, dee, deeper, deepest, defference, definable, deflagration, deformable, defy, degrade, deich, deionization, deisgn, delft, delimit, delineate, demarcation, demarcus, dence, denis, denmark,

denomination, denser, dent, dependency, depict, depletion, depression, deputy, derivable, deryagin, des, describable, descriptively, designate, desk, detectable, determinable, determinant, determinantal, determinate, detude, deutsche, dev, devel, developable, devrease, dewpoint, diaconis, diagonal, diam, diaz, dicamillo, dickinson, dicsover, dictate, diego, dielectric, differentiation, diffuse, diffusely, diffusive, digit, dilation, dill, dilute, dimmock, dipole, dirac, directive, dirichlet, discern, discernible, discoverer, discretefrequency, disequilibrium, dislocation, dismiss, disparity, disperse, dispersion, disposable, dissertation, dissimilar, dissociatingga, dissociationrecombination, distant, disturb, diverse, diversified, doctor, dodecagonal, doggett, dome, don, donnel, doppler, dore, dorodnitsyn, dorodnitzinhowarth, dorodnitzyn, dorrance, dosanjh, doubly, doubtful, dougla, dover, doyle, dp, dragutin, dramatic, dransfield, drape, draper, drastic, drift, drill, drilling, dropoff, drosophila, drougge, drum, du, dubose, duce, ducting, dufour, dugan, dugundi, dugundji, duncan, dunsby, dunwoody, duplicate, duplicated, duralumin, dusinberre, dust, dvl, dx, dyer, e.d, e.e, e.j, e.t, e.v, e.w, e.z, e05a, e53h25, e56b03b, e56l07, e9k25, earl, easier, easiest, echo, econd, economical, economics, economo, economy, ed, eddyviscosity, edelfelt, edelflet, edgedisplacement, edition, edpm, educational, effectmay, effectoriginate, efficacious, efflux, effusion, eggington, eigenvector, einbinder, ejector, elec, electro, electrode, electroformed, electrohydrodynamic, electrostatically, elegant, elemental, elevation, elevator, elimination, ellipselike, elliptically, elongate, embryonic, emerge, emphasise, ence, encircle, endeavour, endorse, endplate, endurance, engesser, eniac, enjoy, enlighten, enormously, enquiry, enskog, ensue, enthalpic, entirety, entitle, entrain, entrant, envisage, epoxy, equatorial, equicohesive, equilateral, equilibrate, equivalently, erature, erdmann, erfc, erickson, erosive, erratic, eter, eucken, eulerian, eventual, everett, evvard, exaggeration, examinable, excessively, exchanger, excuse, exhaustive, exotic, exp, expectation, expend, experimenter, exploration, explosive, exponentiallyefficient, expound, extendible, extensible, extinction, extra, extremal, eye, f.d, f.f, f.k, f.m, f0, f1, f2, f40umerical, f8u, fa, facet, fage, faget, falangan, fale, fano, farmingdale, fasten, fat, faulder, fd, fettermann, fewer, fibrous, fictitious, fictitiously, figs., financial, fine, finely, finest, finish, finitedifference, fire, firm, firmer, firstorder, fisher, fission, fixedpitch, fk, fl, flagg, flanged, flash, flatness, flatplate, flax, flex, fllayer, flocculent, florida, fluiddynamic, fluidize, fm, fn, foelsch, fog, fohrman, folson, forbe, forcible, forecast, forecasting, forefront, foreknowledge, formulism, forray, forst, fort, forty, forwardacceleration, forwardflight, foughner, foundation, fourcomponent, fourthorder, fourwave, fox, fr, fraiser, france, francis, frank, frankel, fredholm, freedman, freudenthal, frictionless, friedman, frontal, frozenflow, fruit, frustration, ftl, fujihiko, fund, fur, furnace, fuse, fuselagesection, fx, fz, g.a, g.b, g.d, g.i, g.j, g.m, g.z, gallagher, gardless, garner, gascous, gasdynamical, gather, gaydon, geckeler, gee, gehr, genuine, geoffrey, geophy, geophysical, georgia, germany, gerrard, gersten, gibb, gilbert, gill, ginzel, giraud, glance, glassy, glenny, glick, globule, glycerin, gm, goal, goddard, goebel, goetz, golian, gollnick, goodier, goodwin, gorcum, goree, gothic, gottenberg, gouse, graduate, gram, grand, grant, granular, granville, grape, grashof, grasshof, gravitz, gray, grazing, greensite, gregg, gridwork, grifith, grober, groove, grossman, grunow, guggenheim, guy, gyration, gyroscope, gyroscopic, h.d, h.g, h.t, h180, h2, h2o, haag, haberman, hadamard, haggemacher, hain, hale, haley, halfangle, halfway, halstead, halve, hama, hamel, hamilton, hammerhead, hammerling, hammond, hamper, hanawalt, hancock, handbook, handicap, handley, hanging, hankelman, hantzsche, hara, hardware, harold, hartnett, hartunian, hash,

haskell, haslet, hasse, hasten, hasting, hauser, haveg, hay, hayday, hayer, hayman, hazard, heading, heaslet, heaslett, heave, heavier, heighth, heimel, heimenz, heisler, heldenfel, helger, helical, heliocentric, hemi, hemispheroidal, hencky, hennessy, herberle, hero, herriot, herrnstein, heuman, heywood, hickman, hicks2, highenergy, higherorder, highfrequency, highvelocity, hilsenrath, himself, hinder, hingeaxis, hinson, hirschfelder, hirshfelder, hislop, historic, historically, hitherto, hm, hodge, hodographic, hog, hoge, holer, holl, holland, holloway, hollowcylinder, homann, home, homing, homogenous, hopelessly, hopf, hopkin, hopper, hosokawa, hosowaka, hotter, houbolt, housefly, housing, howard, howell, howorth, hypersonic, hu, huber, hubka, huckell, huff, hufton, huggett, hugh, hughe, humphrey, hundred, hunter, hunton, hunziker, hurd, hurle, huston, hwa, hybrid, hydraulic, hydraulically, hydroballistic, hydrocarbon, hyett, hyp, hypass, hyperliptic, hypersoule, hysol, hysteretic, i.j, i.l, i.r, i.t, i.w, idealize, identically, identifiable, identity, iferation, igc, ignorable, igy, illinois, illustrious, im, imaginary, imai, imilar, immobile, immovable, impair, impart, imperial, implement, impression, imprimerie, improper, inaccessible, inadmissable, inadvertently, inafinite, inapplicable, inappropriate, inasmuch, inboard, inc, incidental, inclusive, incoming, inconclusive, inconel, inconsistency, inconsistent, incrementalnormal, indefinitely, indetermine, indirectly, indium, inducedpressure, inductance, inefficient, inertial, inevitably, inexpensive, infiniteaspect, infite, influential, ing, inhomogeneous, injectioncool, injector, ink, inletmass, inoperative, inouye, inplane, insect, insertion, inspire, instant, instigate, instruct, instruction, instrumented, intake, integrable, integrand, integrity, integrodifferential, intensification, intensify, intention, intentionally, interanl, interchangeable, intercrystalline, interdependence, interferograms, intergranular, interim, internat, interpose, interpretive, interstellar, intimately, intractable, intrieri, intrinsically, introduce, intuition, invariably, invert, investigaion, inviscidflow, invoke, inwards, inyokern, iodine, iowa, irbm, iron, irritant, isaac, isakson, isochronousstress, isofoam, isolation, isotope, item, j.g, j.n, j.o, j.t, jackson, jacob, jacobian, jahsman, jame, janzen, jaszlic, jay, jeffery, jeffrey, jenson, jetboundary, jetexit, jetlike, jetstream, jmin, jmjn, jogarao, johannesen, johansen, jointly, jouguet, joule, joyce, judiciously, jugoslavia, jukoff, justifiable, k.h, k.j, k.k, k.m, k.w, k0, klth, k2, kallmann, kalman, kana, kanwal, karchmar, kawagutus, keat, keck, keenan, keener, keith, kelley, kempf, kendrick, kenny, kernal, kernelfunction, kerrebrock, kester, keulegan1, keunel, kg, kidalgo, kilakowskus, kilometre, kinematically, kingdom, kink, kinked, kippenhan, kirby, kivel, klebanoff, kleeman, km.no, knee, knox, ko, kochendorfer, kogan, komoda, korkegi, kosson, kramp, krasilshchikova, kriegler, krqus, krumm, krypton, kt, kth, kubota, kuehn, kuethe, l.a, l.d, l.e, l.f, l.o, l.r, l40, l51e09, l52119a, l53e27, l53h04, l54e05a, l54i16, l55k30, l56106, l56e07, l58, l58a16, l58e22, l5d20, l9g06, la, labour, lackman, lacquer, laguerre, laidlaw, lakshmikantham, lambert, laminarboundary, laminarturbulent, laminary, laminate, lance, landau, landrum, langer, langhaar, lap, laplacian, lardner, largeangled, largeaspect, largechord, largescale, late, latent, latitudes, laurence, lavender, lawe, layered, ld, le, leaf, legitimate, lehnert, lender, lengthen, lennard, leonard, letko, letter, letude, lever, levin, levinsky, liable, liapunov, libove, libration, librove, lice, license, lieberstein, liebersten, liepmann, liftingsurface, lightly, liila, lina, linder, lindholm, lineal, linearisation, linearizedtheory, lingitudinal, linjection, liouville, lip, liquidinjection, listing, literal, livesley, livingood, lm, lmethod, localize, localsimilarity, lochtenberg, lock2, locus, logically, loitsianskii, longest, longitudinalvortice, longtime, loo, look, loop, lopatoff, lotz, loudspeaker, loui, lowaspect, lowsubsonic, lowturbulence, lr,

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0.800, 0.805, 0.823, 0.825, 0.84, 0.840, 0.854, 0.8a, 0.90, 0.952, 0.96,
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1.23849, 1.24, 1.27, 1.3x10, 1.400, 1.43, 1.45, 1.450, 1.46, 1.479, 1.48,
1.50, 1.52, 1.55, 1.58, 1.60, 1.61, 1.67, 1.6x10, 1.71, 1.72, 1.74, 1.747,
1.77, 1.78, 1.81, 1.82, 1.85, 1.8x10, 1.91, 1.92, 1.94, 1.944, 1.96, 1.98,
10.3, 10.5, 100degree, 100x10, 109placement, 10g, 10th, 11.2, 11.60, 11.7,
11.78, 1103a, 12.0, 12.4, 124.9, 12degree, 13.1, 13.5, 13.8, 1400degree,
14in, 15.4, 1591, 15x10, 16.6, 17.5, 180degree, 18degree, 18in, 1degree, 1fa,
1x10, 2.00, 2.05, 2.06, 2.1, 2.13, 2.15, 2.18, 2.20, 2.24, 2.25x10, 2.38,
2.3x10, 2.4, 2.41, 2.425, 2.45, 2.47, 2.49, 2.6, 2.67, 2.78, 2.80, 2.86,
2.87, 2.9, 2.96, 2.99, 200degree, 20degreec, 24, 25.1, 26.6, 28.59, 29.5,
29.70, 2by, 2n, 2nd, 2p, 2x10, 3.00, 3.04, 3.07, 3.11, 3.13, 3.15, 3.2, 3.25,
3.2x10, 3.3, 3.392, 3.4, 3.44, 3.50, 3.53, 3.55, 3.6, 3.72, 3.74, 3.8, 3.81,
3.86, 3.899, 3.8x10, 3.9x10, 3000degree, 300degreer, 30th, 31.75, 32pp,
34.5, 3600degree, 4.2, 4.24, 4.36, 4.54, 4.60, 4.65, 4.76, 4.981, 400degree,
40degree, 446j, 49degree, 4ft, 4th, 4x10, 5.04, 5.7, 5.73, 500degree, 55.6,

55degree, 57d19a, 58.1, 58l, 58w, 59a, 5d, 6.00, 6.2, 6.25, 6.28, 6.3, 6.4, 6.9, 6.98, 6000degreek, 63a2xx, 63a4xx, 64a010, 65a004, 65degree, 67.6, 6in, 6th, 7.08, 7.30, 7.35, 7.41, 7.66, 7.7, 7.8, 7.95, 707a, 75, 75degree, 79.5degree, 7a, 7c, 8.0, 8.238, 8.6, 8.60, 800degree, 81e, 85.5, 85degree, 88.8, 8n, 8x10, 9.0, 9.17, 9.2, 9.5, 9.758, 9.9, 99degree, a., a.a, a.g, a.r, a0, a2, a252, a50f06, a51j04, a52b06, a55c08, a55c23, a56b15, ab, abbott, abbrevi, ablatedlength, abovement, absent, abundantli, acceleromet, accentu, access, accident, accru, acet, acquisit, acr, acrodynam, acrothermochemistri, acrothermoelast, actur, adamson, adjacentequilibrium, adjoin, adjoint, admixtur, adsorpt, advent, aeolotrop, aerelast, aerfoil, aerial, aero.2374, aero.2441, aero.2593, aero.2620, aero.2625, aero.2658, aero.2695, aero.2836, aero.2849, aero.348, aero.r, aeroballist, aerocosmonaut, aerodynamich, aerodynamieist, aeroelastician, aeronautiqu, aerotherm, aerothermochem, aerothermodynam, aerothermoelast, affirm, afftc, afresh, afterflow, ag, agenc, agraw, ailcron, airborn, aircrafttyp, airforc, airlin, airload, airscrew, akin, all029, alan, algranti, align, alksn, allcock, allmov, allround, allud, altogeth, amer, amongst, ampl, ampli, analytici, anastasio, andland, angel, anh, anhedr, anid, anisotropi, ann, annex, anniv, announc, annual, annul, anov, anthoni, anti, antielast, anywai, aob, apoge, app.mech, apparentmass, approach, approx, apropi, aquart, arbor, arch, ardc, aren, ari, armstrong, arrest, arrow, arsj, ascrib, ashlei, ashwel, asid, asimplifi, ask, aspectratio, assert, assort, assur, astro, astroph, astrophys, ataback, atlarg, atospher, attaindd, atten, audio, aural, auspic, avalu, avov, avro, axialthrust, ayr, b.e, b.j, b.m, b.o, backup, backward, bakanov, balsa, ban, bang, barber, bare, barmbi, baron, barrel, barri, bartl, basetyp, baughman, bc, beasley, beat, beckett, bed, beg, belief, bellevil, bellman, belltyp, belt, bendict, bendingtors, benser, bent, benton, beograd, ber, berger, bergl, bergmann, berlot, bernard, berndt, berner, bernoulli, berthelot, beskin, beta, bethpag, bevel, beyween, bijlaard, billow, bimetal, bimolecular, birchal, birnbaum, bisector, bisplinghoff, blacki, blackstock, bland, bleich, blend, bless, blown, blowout, bloxson, blue, bluish, bluntrail, bo, board, boat, bobbitt, bodt, boiloff, boison, bolshakov, bolz, bomb, bonu, boost, borcher, bore, bornel, bounari, boundwel, boxal, boyd, boyer, bracalent, bracket, branchlin, brandmaier, bratt, braunschweig, breguet, breckman, brevoort, bright, bristol, britton, broadbent, broadwel, broke, bromm, brother, brower, bruch, brush, bryce, bryer, bryson, builtup, bulent, bulg, bulkhead, bullen, bullet, bump, buoyanc, burgraf,huri, burk, burton, butler, buzz, bypass, c., c.a, c.h, c.k, c.o, c.r, c.w, c0.35, cabin, calib, callaghan, callahan, cam.phil, camac, camb, camera, canard, cant, capillari, capsul, caravel, carbid, carborundum, card, carderock, cardullo, caret, carro, casaccio, cast, castigliano, castil, castolit, cater, catheral, cathod, caution, cellulos, centaur, centerof, centigrad, centrelin, centripet, centroid, certainti, ceuler, cf, chain, chalr, chann, chap, characteristi, charczenko, charter, chase, chaudhuri, chemisorpt, chen, cheski, chester, chien, child, chilver, ching, chinitz, chinneck, choleski, chou, chow, chrichlow, christiaen, christian, circuit, circuitri, circumlunar, citi, clamshel, classifi, classificaiton, claus, clausen, clean, clearanc, climin, clinton, clipping, closest, closur, clouston, clutter, co2, coalesc, coars, coast, coat, coe, coefstant, coher, colder, coleman, colloc, colour, colston, columnmateri, combustionh, combut, command, commenc, comp, companion, compet, competit, complimentari, compound, compressibleflow, compression, compressors.dash, concoct, concret, condamp, conductioncontrol, conductionexpans, conductor, conf, confid, conformaltransform, congr, conical.dash, conidt, connexion, connor, compress, consier, consolid, constanc, constantdens, constantinescu, constantino, constantli, consumpt, contempl, context, conti, contradict, convair, convergentdiverg, convict, convolut, cooksei, cooler, cope, copper, corollari, corp, corpuscular,

correlogram, cortright, cosin, cosmonaut, coulomb, coundari, count, counteract, counterclockwis, coupon, cp, cp.1913, cp.227, cp.255, cp.324, cp.379, cp.477, cp.525, cp.555, cp.557, cp.568, cp.602, cp.617, cp.626, cp.633, cp115, cp213, cp271, cp394, craft, creager, creas, creepbuckl, crest, crinolin, crook, crosscorrel, crush, csanadi, cubbison, culebra, cum, cumbersom, cure, curran, curri, curtain, curti, cuss, cutoff, cx, cylinder, cylinderhemispher, d.and, d.b, d.d, d.f, d.g, d.h, d1299, d704, daiber, dalei, dalton, dampomet, dana, dashn, dashth, dashthat, daughadai, daytim, debat, dec, decad, decidedli, declassifi, declin, decompos, decomposit, dee, deeper, deepest, deffer, defi, deflagr, degrad, deich, deioniz, deisgn, delft, delimit, delin, demarc, demarcu, denc, deni, denmark, denomin, denser, dent, depict, deplet, depress, deputi, deryagin, desk, determinant, detud, deutsch, dev, devel, devreas, dewpoint, diaconi, diagon, diam, diaz, dicamillo, dickinson, dicsov, dictat, diego, dielectr, dilat, dill, dilut, dimmock, dipol, dirac, dirichlet, discover, discretefrequ, disequilibrium, disloc, dismiss, dispar, dispos, dissert, dissimilar, dissociatingga, dissociationrecombin, distant, divers, diversifi, doctor, dodecagon, doggett, dome, don, doppler, dore, dorodnitsyn, dorodnitzinhowarth, dorodnitzyn, dorranc, dosanjh, doubli, dougla, dover, doyl, dp, dragutin, dramat, dransfield, drape, draper, drift, dropoff, drosophila, drougg, drum, du, dubos, duce, dufour, dukan, dugundi, dugundji, duncan, dunsbi, dunwoodi, duralumin, dusinberr, dust, dvl, dx, dyer, e.d, e.j, e.t, e.v, e.w, e.z, e05a, e53h25, e56b03b, e56l07, e9k25, earl, easier, easiest, echo, econ, economi, economo, ed, eddyviscos, edelfelt, edelflet, edgedisplac, edit, edpm, educ, effectmai, effectorigin, efficaci, efflux, effus, eggington, eigenvector, einbind, ejector, elec, electro, electro, electroform, electrohydrodynam, electrostat, eleg, ellipselik, elong, embryon, emerg, emphasis, enc, encircl, endeavour, endors, endplat, endur, engess, eniac, enjoi, enlighten, enorm, enquiri, enskog, ensu, enthalp, entireti, entitl, entrant, envisag, epoxi, equatori, equicoches, equilater, equilibr, equilibria, eratur, erdmann, erfc, erickson, errat, eter, eucken, eulerian, everett, evvard, exagger, excus, exot, exp, expend, exponentiallyfici, expound, extinct, extra, ey, f.d, f.f, f.k, f.m, f0, f1, f2, f40umer, f8u, fa, facet, fage, faget, falangan, fale, fano, farmingdal, fasten, fat, faulder, fd, fettermen, fewer, fibrou, figs.1, financi, finest, finish, finitediffer, firm, firmer, firstord, fisher, fission, fixedpitch, fk, fl, flagg, flash, flatplat, flax, flex, fli, flayer, floccul, florida, fluidodynam, fluidiz, fm, fn, focu, foelsch, fog, fohrman, folson, forb, forcibl, forefront, foreknowledg, forrai, forst, fort, forti, forwardacceler, forwardflight, foughner, foundat, fourcompon, fourthord, fourwav, fox, fr, fraiser, franc, franci, frank, frankel, fredholm, freedman, freudenth, frictionless, friedman, frontal, frozenflow, frustrat, ft1, fujihiko, fund, fur, furnac, fuse, fuselagesect, fx, fz, g.a, g.b, g.d, g.i, g.j, g.m, g.z, gallagh, gardless, garner, gascou, gather, gaydon, geckel, gee, gehr, genuin, geoffrei, geophi, geophys, georgia, germani, gerrard, gersten, gibb, gilbert, gill, ginzel, giraud, glanc, glassi, glenni, glick, globul, glycerin, gm, goal, goddard, goe, goebel, goetz, golian, gollnick, goodier, goodwin, gorum, gore, gothic, gottenberg, gous, graduat, grai, gram, grand, grant, granular, granvil, grape, grashof, grasshof, gravitz, graze, greensit, gregg, gridwork, grifith, grober, groov, grossman, grunow, guggenheim, gui, gyrat, gyroscop, h.d, h.g, h.t, h180, h2, h2o, haag, haberman, hadamard, haggemmach, hai, hale, halei, halfangl, halfwai, halstead, hama, hamel, hamilton, hammerhead, hammerl, hammond, hamper, hanawalt, hancock, handbook, handicap, handlei, hangl, hankelman, hantzs, hara, hardwar, harold, hartnett, hartunian, hash, haskel, haslet, hass, hast, hasten, hauser, haveg, haydai, hayer, hayman, hazard, heaslet, heaslett, heav, heavier, heighth, heimel, heimenz, heisler, heldenfel, helger, helic, heliocentr, hemi, hemispheroid,

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