1. **Turn in the vector representation of the query (10 points per weighting scheme), and the top 5 documents for the query under both weighting schemes (50 points, with 25 points per weighting scheme). You are also required to present the vector representations for each of the first 5 ranked documents.**

Please check ‘output.txt’

1. **Indicate the rank, score, external document identifier, and headline, for each of the top 5 documents for each query. (5 points)**

Please check ‘output.txt’

1. **Identify which documents you think are relevant and non-relevant for each query. (10 points)**

Query001

what similarity laws must be obeyed when constructing aeroelastic models

of heated high speed aircraft .

Relevant Docs: 486, 51, 12, 184

Not relevant: 573, 14, 1268

Query002

what are the structural and aeroelastic problems associated with flight

of high speed aircraft .

Relevant Docs: 12, 746, 172, 792

Not Relevant: 14, 51

Query004

what problems of heat conduction in composite slabs have been solved so

far .

Relevant Docs: 485, 144, 5, 399, 181

Not Relevant: NULL

Query008

can a criterion be developed to show empirically the validity of flow

solutions for chemically reacting gas mixtures based on the simplifying

assumption of instantaneous local chemical equilibrium .

Relevant Docs: 1061, 166, 488

Not relevant: 575, 24, 1255

Query009

what chemical kinetic system is applicable to hypersonic aerodynamic

problems .

Relevant Docs: 401, 1147

Not Relevant: 103, 625, 163, 1296, 342

Query010

what theoretical and experimental guides do we have as to turbulent

couette flow behaviour .

Relevant Docs: 257, 798, 491, 315, 386, 1374

Non-Relevant Docs: 121

Query012

is it possible to relate the available pressure distributions for an

ogive forebody at zero angle of attack to the lower surface pressures of

an equivalent ogive forebody at angle of attack .

Relevant Docs: 492, 122, 56, 232

Non-Relevant Docs: 57, 1040, 695, 1231

Query013

what methods -dash exact or approximate -dash are presently available

for predicting body pressures at angle of attack.

Relevant Docs: 122, 124, 492, 232

Non-Relevant Docs: 433, 292

Query015

papers on internal /slip flow/ heat transfer studies .

Relevant Docs: 550, 21, 22, 571, 270

Non-Relevant Docs: 45

Query018

are real-gas transport properties for air available over a wide range of

enthalpies and densities .

Relevant Docs: 493, 302, 949, 332

Non-Relevant Docs: 1143, 1264, 1199, 583

Query022

is it possible to find an analytical, similar solution of the strong

blast wave problem in the newtonian approximation .

Relevant Docs: 495, 572

Non Relevant Docs: 72, 1147, 110, 160

Query023

how can the aerodynamic performance of channel flow ground effect

machines be calculated .

Relevant Docs: 624, 966

Non Relevant: 650, 506, 792, 1339

Query026

what is the basic mechanism of the transonic aileron buzz .

Relevant Docs: 496, 440

Non Relevant: 903, 520, 313, 38

Query027

papers on shock-sound wave interaction .

Relevant Docs: 64, 798, 170, 132

Non Relevant: 65, 402, 291

Query029

material properties of photoelastic materials .

Relevant docs: 462, 463

Not Relevant: 1025, 82, 1043, 1099, 1340

Query031

can the transverse potential flow about a body of revolution be

calculated efficiently by an electronic computer .

Relevant Documents: 498, 1255, 106, 927

Non Relevant Documents: 869

Query032

can the three-dimensional problem of a transverse potential flow about

a body of revolution be reduced to a two-dimensional problem .

Relevant Documents: 1108

Non Relevant Documents: 1301, 373, 1248, 266, 1281

Query033

are experimental pressure distributions on bodies of revolution at angle

of attack available .

Relevant Documents: 197, 927

Non Relevant Documents: 234, 498, 248, 1352

Query034

does there exist a good basic treatment of the dynamics of re-entry

combining consideration of realistic effects with relative simplicity of

results .

Relevant Documents: 82

Non Relevant Documents: 274, 1346, 1279, 927, 1296

Query035

has anyone formally determined the influence of joule heating, produced

by the induced current, in magnetohydrodynamic free convection flows

under general conditions .

Relevant Documents: 500, 456

Non Relevant Documents: 268, 270, 88, 123

Query039

why does the compressibility transformation fail to correlate the high

speed data for helium and air .

Relevant Documents: 1263, 68

Non Relevant Documents: 502, 686,302,7

Query040

did anyone else discover that the turbulent skin friction is not over

sensitive to the nature of the variation of the viscosity with

temperature .

Relevant Documents: 413, 125

Non Relevant Documents: 962,125,560,307,62,72

Query041

what progress has been made in research on unsteady aerodynamics .

Relevant Documents: 902

Non Relevant Documents: 370,892,789,244,1380

Query049

what are the factors which influence the time required to invert large

structural matrices .

Relevant Documents: 756, 46

Non Relevant Documents: 1361, 47, 83

Query050

does a practical flow follow the theoretical concepts for the

interaction between adjacent blade rows of a supersonic cascade .

Relevant Documents: 213

Non Relevant Documents: 121, 277, 798, 216

Query051

what is a single approximate formula for the displacement thickness of

a laminar boundary layer in compressible flow on a flat plate .

Relevant Documents: 307

Non Relevant Documents: 145, 611, 96, 572

Query052

how is the design of ring or part ring wings by linear theory affected

by thickness .

Relevant Documents: 96, 307

Non Relevant Documents: 145, 611, 305

Query053

what application has the linear theory design of curved wings .

Relevant Documents: 428

Non Relevant Documents:798, 752, 680, 42

Query054

what is the effect of cross sectional shape on the flow over simple

delta wings with sharp leading edges .

Relevant Documents: 798, 1380, 674

Non Relevant Documents: 367, 251

Query055

papers on flow visualization on slender conical wings .

Relevant Documents: 465, 601

Non Relevant Documents: 901, 146, 683

Query056

what size of end plate can be safely used to simulate two-dimensional

flow conditions over a bluff cylindrical body of finite aspect ratio .

Relevant Documents: 751, 1209

Non Relevant Documents: 916, 1040, 94

Query057

to find an approximate correction for thickness in slender thin-wing

theory .

Relevant Documents: 752, 901

Non Relevant Documents: 601, 1259, 683

Query058

how do interference-free longitudinal stability measurements (made

using free-flight models) compare with similar measurements made in

a low-blockage wind tunnel .

Relevant Documents: 516, 431

Non Relevant Documents: 141, 252, 1163

Query059

have wind tunnel interference effects been investigated on a systematic

basis .

Relevant Documents: 1153, 431, 516

Non Relevant Documents: 672, 799

Query061

are there any papers dealing with acoustic wave propagation in reacting

gases .

Relevant Documents: 1244

Non Relevant Documents: 319, 1203, 1208, 1189

Query062

has anyone investigated relaxation effects on gaseous heat transfer to a

suddenly heated wall .

Relevant Documents: 168

Non Relevant Documents: 123, 274, 1268, 646

Query066

are there any theoretical methods for predicting base pressure .

Relevant Documents: 1086

Non Relevant Documents: 283, 234, 522, 1229

Query067

does transition in the hypersonic wake depend on body geometry and size

Relevant Documents: 536

Non Relevant Documents:25, 272, 89, 1373

Query068

how can one detect transition phenomena in boundary layers .

Relevant Documents: 346, 1205

Non Relevant Documents: 272, 43, 37

Query069

how can one detect transition phenomena in hypersonic wakes .

Relevant Documents: NULL

Non Relevant Documents: 536, 37, 976, 1205, 272

Query071

has anyone investigated and developed a simple model for the vortex

wake behind a cruciform wing .

Relevant Documents: 927

Non Relevant Documents: 289, 433, 520, 432

Query072

what is a criterion that the transonic flow around an airfoil with a

round leading edge be validly analyzed by the linearized transonic flow

theory .

Relevant Documents: 521

Non Relevant Documents: 526, 440, 496, 1320

Query074

can the transonic flow around an arbitrary smooth thin airfoil be

analysed in a simple approximate way .

Relevant Documents: 467

Non Relevant Documents: 469, 903, 193, 404

Query079

what are the details of the rigorous kinetic theory of gases .

(chapman-enskog theory) .

Relevant Documents: 1190, 1199

Non Relevant Documents: 49, 103, 317

Query080

has anyone investigated the effect of surface mass transfer on

hypersonic viscous interactions .

Relevant Documents: 305

Non Relevant Documents: 525, 545, 540, 572, 329

Query081

what is the combined effect of surface heat and mass transfer on

hypersonic flow .

Relevant Documents:

Non Relevant Documents:

Query082

what are the existing solutions for hypersonic viscous interactions over

an insulated flat plate .

Query083

what controls leading-edge attachment at transonic speeds .

Relevant Documents:

Non Relevant Documents:

Query084

can the three-point boundary-value problem for the blasius equation

be integrated numerically, using suitable transformations, without

iteration on the boundary conditions .

Relevant Documents: 305, 572

Non Relevant Documents: 123, 274, 353

Query085

what are the effects of small amounts of gas rarefaction on the

characteristics of the boundary layers on slender bodies of revolution .

Relevant Documents: 329

Non Relevant Documents: 25, 192, 576

(There are 77 queries in total. Here list first 40 queries and last 5 queries)

Query114

what role does the effect of chemical reaction (particularly when out of

equilibrium) play in the similitude laws governing hypersonic flows over

slender aerodynamic bodies .

Relevant Documents: 332, 541, 401

Non Relevant Documents: 625, 1296

Query116

how significant is the possible pressure of a dissociated free stream

with respect to the realization of hypersonic simulation in high

enthalpy wind tunnels .

Relevant Documents: 576

Non Relevant Documents: 625, 372, 1153, 364

Query118

do the discrepancies among current analyses of the vorticity effect

on stagnation-point heat transfer result primarily from the

differences in the viscosity-temperature law assumed .

Relevant Documents: 82

Non Relevant Documents: 73, 328, 55, 329

Query119

how far can one trust the linear viscosity-temperature solution

assumed in some of the analyses of hypersonic shock layer at low

reynolds number .

Relevant Documents: 328, 667

Non Relevant Documents: 666, 630, 1198

Query120

how close is the comparison of the shock layer theory with existing

experiments in the low reynolds number (merged-layer) regime .

Relevant Documents: 1264, 572

Non Relevant Documents: 329, 1395, 667

1. **Describe why the top-ranked non-relevant document for each query did not get a lower score. (5 points)**

I think the reason why top-ranked non-relevant document for each query get a higher score is that it contains less terms, but those terms are repeated frequently. In this case, it may gain more term weight base on the function we used to calculate term frequency. It these a few high frequency word happened to be not important, then irrelevant document will be displayed due to higher score.

1. **Briefly discuss the different effects you notice with the two weighting schemes, either on a query-by-query basis or overall, whichever is most illuminating. For example, you can point out that the weighting scheme seems to be working for this query as well as a list of other queries, but not for some other queries you have noticed. Try to explain why it works and why it does not work.(5 points)**

W1 = (0.4 + 0.6 \* log (tf + 0.5) / log (maxtf + 1.0)) \* (log (collectionsize / df)/ log (collectionsize))

W2 = (0.4 + 0.6 \* (tf / (tf + 0.5 + 1.5 \* (doclen / avgdoclen))) \* log (collectionsize / df)/ log (collectionsize))

As we can see from the 2 term weight functions, the difference is W1 use max term frequency as parameter, and W2 use document length and average document length as parameters.

If a non-important terms in query occurs many times in a document, it may lead to higher score of an irrelevant retrieval. So W1 will consider the max term frequency and do normalization to counteract the side effect.

If a large document with greater length may have higher score due to more terms in the passage. To avoid this, W2 introduce doclen and avgdoclen to normalize document length to provide a better scoring.

1. **Describe the design decisions you made in building your ranking system. (5 points)**

In my design, I start from the home work 2 and further added 3 class

1. QueryParser.java : parse query in to separate dictionaries
2. SortByValueMap.java: use a special map to contains <Doc, Score> sorted by value
3. TermWeightCalculater.java: calculate W1, W2, and display result.