

COMP474-6741 Project Assignment #1

Richard Nguyen

Arman Jahanpour

Wei Lien Huang

Wasim Boughattas

April 12, 2022

1 Competency Questions Part I

The competency questions focused on how the agent would be able to assess relations between the student class and the university class as well as testing various types of SPARQL queries. Including the first 3 that were mentioned in the handout, they are as follows:

1. What is course [SUBJECT][COURSE NUMBER], that is offered by [UNIVERSITY], about?
2. Which topics is [STUDENT FIRST NAME] [STUDENT LAST NAME] competent in?
3. Which subjects at [UNIVERSITY] teach [TOPIC]?
4. What are all the courses with a [SUBJECT] subject at [UNIVERSITY]?
5. How many students are enrolled in each course that is offered by [UNIVERSITY]?
6. What courses are worth [CREDITS] credits at [UNIVERSITY]?
7. What are the topics of [SUBJECT][COURSE NUMBER] at [UNIVERSITY]?
8. Which students have retaken the same course at least [COUNT]?
9. Which students failed [SUBJECT][COURSE NUMBER] at [UNIVERSITY]?
10. What are the [REQUIREMENT STATUS] readings' [TITLE] and [URL] in [SUBJECT] [COURSE NUMBER] offered by [UNIVERSITY] in lecture [NUMBER]?

2 Vocabulary

The vocabulary and schema of the knowledge base were modeled by following standard W3C technologies: RDF and RDFS, by utilizing existing vocabularies¹: Dublin Core, DBpedia, foaf, owl, vcard, wikidata, xsd, and vivo and were extended using developed classes and properties [1][2][3][4][5][6][7][8][9][10]. Table 1 highlights the classes and properties used to model the information². Existing vocabularies were utilized in the modeling of the schema for properties and classes wherever possible as they're well maintained, updated regularly, commonly used, and link the data to existing knowledge graphs.

¹For more details regarding classes and properties used from existing vocabularies refer to figure 1 in the appendix.

²For more details regarding developed classes and properties refer to the schema.

Information	Class/Property
Universities	vivo:University
University name	rdfs:label
Link	owl:sameAs
Courses	vivo:Course
Course name	vivo:Title
Course subject	vivo:hasSubjectAre
Course number	vivo:identification
Course credits	vivo:CourseCredits
Course description	vivo:description
Course outline	focu:outline
Lectures	focu:lecture
Lecture number	bibo:number
Lecture name	vivo:Title
Lecture content	vivo:contains
Slides	focu:slide
Worksheets	focu:worksheet
Outline	focu:outline
Readings	focu:readings
Other material	focu:otherMaterial
Topics	focu:topic
Provenance information	focu:source
Students	focu:vivoStudent
Student name(first, last)	foaf:givenName, foaf:familyName
Student ID number	vivo:identification
Student email	foaf:mbox
Student completed courses	focu:completedCourse
Student competencies	focu:hasExpertise

Table 1: Information and Vocabulary

3 Knowledge Base Construction and Population

The data for courses was taken from Concordia open data website [11] and the data for universities was taken from DBpedia. As for other files (e.g., outline, slides, worksheets, ... of previous courses) local copies attained from course website and Moodle were used. To populate the knowledge base, for each information class: universities, courses, lectures, topics, and students a getRDF script was developed to generate related triples. The getRDF script for universities, courses, lectures, and students generates the triples automatically. To generate topics triples, course material (slides, worksheets, labs, and outline) were converted to plain text using pdfplumber library [12]. Next, DBpedia Spotlight is run over the converted documents for entity linking from which a list of entities and their DBpedia URI is extracted [13]. Lastly the aforementioned list is passed through a spaCy filter to extract named entities [14]. The filter is designed to select entities with specific POS tags obtained from spaCy glossary [15].

4 Knowledge Base Statistics

In addition, we provided queries and their output for statistics about our knowledge base, including the total number of triples, the number of distinct topics, and the number of topic/course instances:

triples	distinct_topics	topic_instances
309241	329	817

5 Queries

For translating the competency questions into queries, the values that are surrounded by square braces are given values for the queries. These would be used as starting points for the queries, eventually these will be part of the user's input which will change depending on the request without having to rewrite the entire query. As for the return values, these depended on what the question was. In general, the question was analyzed to see which class would contain the desired values then using the input values to form a series of triples that would link to them. Example outputs of the queries are as follows, note that for some of the queries only a small sample of their output is shown and due to the random generated nature of the knowledge base, the outputs shown are for a certain instance of the knowledge base

5.1 Part I

NB— Implemented in Chatbot (✓)

courseName	courseNumber	title	courseDesc
COMP	474	Intelligent Systems	Rule-based exp...

Part I: Query 1: What is COMP 474, that is offered by Concordia University, about?

expertise
Heidelberg
Stuart Russell
Diffbot
...

Part I: Query 2: Which topics is Trenae Bryan competent in?

courseName	subjectArea	courseNum	frequency
Intelligent Systems	RELI	474	48
INTRO TO A.I.	SOCI	6721	4

Part I: Query 3: Which subjects at Concordia University teach DBpedia?

course	subjectCode	courseNum
SELECTED TOPICS IN SOFTWARE	COMP	749
Techniques in Symbolic Computation	COMP	367
Design and Analysis of Algorithms	COMP	465
...

Part I: Query 4: What are all the courses with a COMP subject at Concordia University?

subject	catalog	count
ACCO	220	5
ACCO	230	4
ACCO	240	6
ACCO	310	4
...

Part I: Query 5: How many students are enrolled in each course that is offered by Concordia University?

title	subjectCode	courseNum	credit
NONLINEAR SYSTEMS	ENGR	6141	4.0
TUTORIAL IN INF SYS/...	ACCO	603	4.0
CAPSTONE AEROSPACE ...	AERO	490	4.0
...

Part I: Query 6: What courses are worth 4.0 credits at Concordia University?

expertise
Heidelberg
Stuart Russell
Diffbot
...

Part I: Query 7: What are the topics of COMP 474 at Concordia University?

subjectArea	catalog	firstName	lastName	studentID	nbTimesTaken
AHSC	330	Breia	Crowell	43248687	2
ANTH	270	Sanya	Ray	41103045	2
ANTH	345	Sinead	Thomas	47855211	2
...

Part I: Query 8: Which students have retaken the same course at least 2 times?

firstName	lastName	studentID	courseName	courseNumber	grade
Mariela	Morrow	43952942	SOCI	336	F

Part I: Query 9: Which students have failed SOCI 336 at Concordia University?

reqLabel	title	website
required	[Yu14,Chapters1,2]...	https://concordia...
supplemental	[Wor14](RDFPrimer)...	http://www.w3.org...
supplemental	[RN10,Chapter12]...	https://concordia...
supplemental	Graphdatabases...	https://www.youtube...

Part I: Query 10: What are the readings for COMP 474 offered by Concordia University in lecture 2?

5.2 Part II

5.2.1 Knowledge Base Population

NB— Not Implemented in Chatbot (✗)

subject	catalog	topicLabel	dbpediaURI	eventURI	resourceURI
COMP	474	Heidelberg	...Heidelberg
COMP	474	... Russell	..._Russell
...
COMP	6721	Centroid	.../Centroid
...

Part II: Query 1: For a course c, list all covered topics t, printing out their English labels and their DBpedia URI, together with the course event URI (e.g., 'lab3') and resource URI (e.g., 'slides10') where they appeared.

dbpediaURI	topicLabel	catalog	subject	topicCount
.../Concordia_University	Concordia	474	COMP	75
.../DBpedia	DBpedia	474	COMP	36
.../English_language	English language	474	COMP	24
...
.../Artificial_intelligence	AI	6721	COMP	18
.../Natural_language_processing	Natural Language ...	474	COMP	15
...

Part II: Query 2: For a given topic t (DBpedia URI), list all courses where they appear, together with a count, sorted by frequency

topicLabel	courseURI	eventURI	resourceURI
Data Publishing	...#courseID_005484	.../data#005484_Lecture05	.../slides05.pdf
Weak AI	...#courseID_040353	.../data#040353_Lecture01	.../slides01.pdf
...

Part II: Query 3: For a given topic t, list the precise course URI, course event URI and corresponding resource URI where the topic is covered (e.g., "NLP" is covered in COMP474 → Lecture 10 → Lab 10 → Lab Notes)

5.2.2 University Chatbot

NB— Implemented in Chatbot (✓)

Some of the queries coincide with existing queries in part I:

1. see queries 1-10 in part I
2. "What is the [course] about?" : see query 1 in part I
3. "Which topics are covered in [course event]?" : See below

topicLabel	resourceURI
XOR	/worksheet05.pdf
neuron	/worksheet05.pdf
Perceptron	/worksheet05.pdf
Delta	/worksheet05.pdf
Alison	/worksheet05.pdf

Part II: Query 4: Which topics are covered in worksheet 5 of COMP 6721?

4. "Which courses cover [Topic]?" : see query 3 in part I

6 Rasa Chatbot

For designing the chatbot, we used the competency questions that were associated with each query. That way, we can see where the chatbot should extract the variables. This is represented by the words surrounded by square brackets as seen in Section 1. The variables would be extracted using Rasa's entity system to pull the text from input and classify them. Once the variables are extracted and stored in the chatbot's memory, which is done using the slots, it would place those into the appropriate query. We provided structure of the queries to the bot in its custom action classes and it just needs to substitute the variables. Afterwards, the bot makes a request to the Fuseki server, that contains our Knowledge Base, with the completed query and receives a response from the server. To make the output more human-readable, as the response is in JSON format, we extract the values from it and lay it out as a text list which the chatbot will display onto the command terminal. As for dealing with exception cases, the bot has a few responses built in to handle them by replying to a message to communicate the issue with the user.

For the sample responses from the chatbot for the questions from the user, please see the appendix at the end. Note that for some of the responses, only a portion of it is shown.

7 References

[1] “RDF 1.1 Concepts and Abstract Syntax.” [Online]. Available: <https://www.w3.org/TR/rdf11-concepts/>. [Accessed: Mar. 22, 2022]

[2] “RDF Schema 1.1.” [Online]. Available: <https://www.w3.org/TR/rdf-schema/>. [Accessed: Mar. 22, 2022]

[3] “DCMI Schemas.” [Online]. Available: <https://www.dublincore.org/schemas/>. [Accessed: Mar. 22, 2022]

[4] “Home,” DBpedia Association. [Online]. Available: <https://www.dbpedia.org/>. [Accessed: Mar. 22, 2022]

[5] “FOAF Vocabulary Specification.” [Online]. Available: <http://xmlns.com/foaf/spec/>. [Accessed: Mar. 22, 2022]

[6] “OWL Web Ontology Language Overview.” [Online]. Available: <https://www.w3.org/TR/owl-features/>. [Accessed: Mar. 22, 2022]

[7] “vCard Ontology - for describing People and Organizations.” [Online]. Available: <https://www.w3.org/TR/vcard-rdf/>. [Accessed: Mar. 22, 2022]

[8] “Wikidata.” [Online]. Available: https://www.wikidata.org/wiki/Wikidata:Main_Page. [Accessed: Mar. 22, 2022]

[9] “W3C XML Schema Definition Language (XSD) 1.1 Part 1: Structures.” [Online]. Available: <https://www.w3.org/TR/xmlschema11-1/>. [Accessed: Mar. 22, 2022]

[10] “Linked Open Vocabularies (LOV).” [Online]. Available: <https://lov.linkeddata.es/dataset/lov/vocabs/vivo>. [Accessed: Mar. 22, 2022]

[11] “Opendata - Administrative module.” [Online]. Available: <https://opendata.concordia.ca/datasets/>. [Accessed: Mar. 22, 2022]

[12] “pdfplumber.” <https://github.com/jsvine/pdfplumber/> [accessed Apr. 11, 2022].

[13] “DBpedia Spotlight - Shedding light on the web of documents.” <https://www.dbpedia-spotlight.org/> [accessed Apr. 11, 2022].

[14] “spaCy · Industrial-strength Natural Language Processing in Python.” <https://spacy.io/> [accessed Apr. 11, 2022].

[15] M. Honnibal, I. Montani, S. Van Landeghem, and A. Boyd, spaCy: Industrial-strength Natural Language Processing in Python. 2020. Accessed: Apr. 11, 2022. [Online]. Available: <https://github.com/explosion/spaCy/blob/>

[d4196a62f198f0ec32239b238f32421bbb6eb942/spacy/glossary.py](https://github.com/explosion/spaCy/blob/d4196a62f198f0ec32239b238f32421bbb6eb942/spacy/glossary.py)

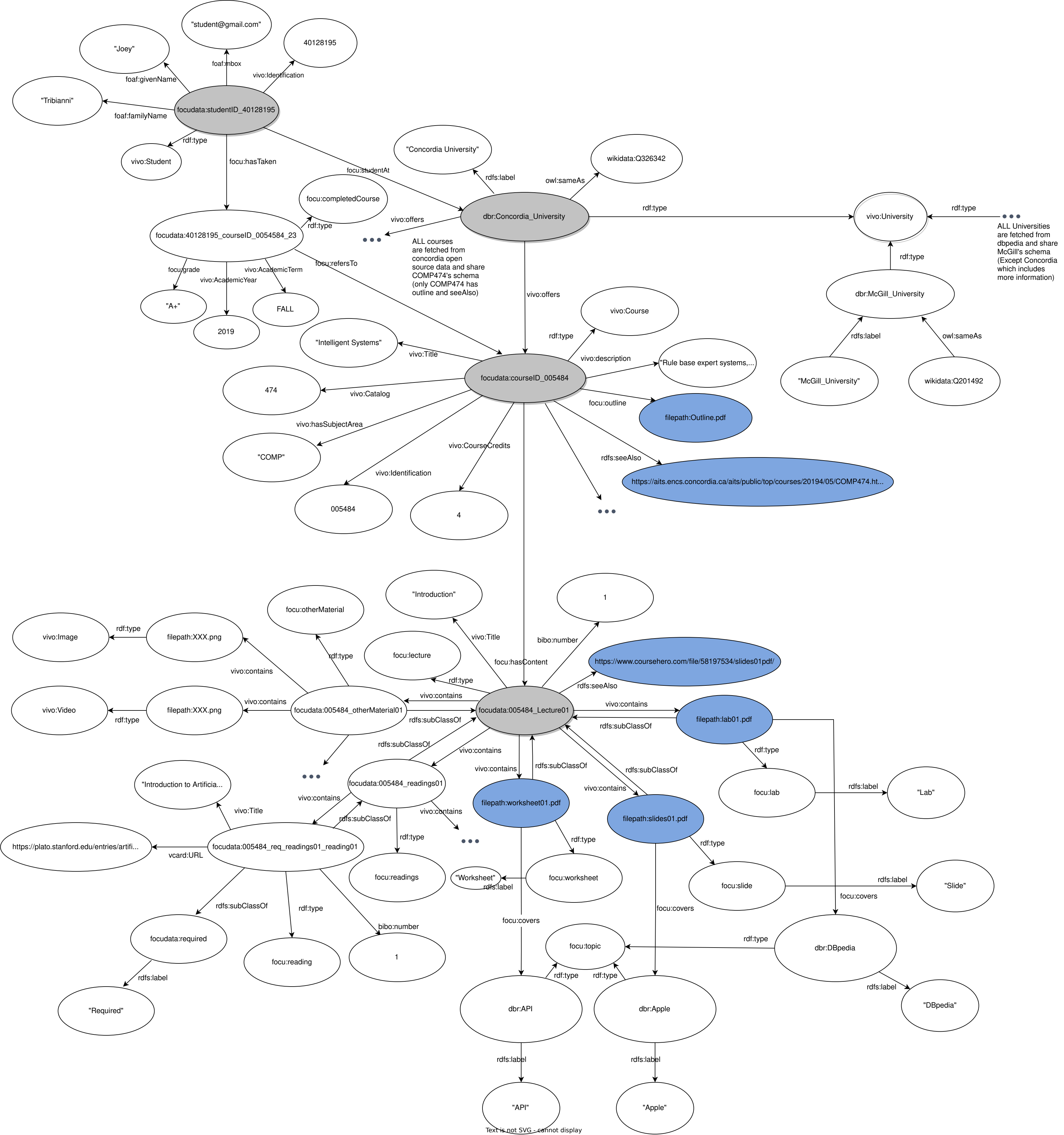
[15] “DBpedia Spotlight - Shedding light on the web of documents.” <https://www.dbpedia-spotlight.org/> [accessed Apr. 11, 2022].

8 Appendix

See next page

9 Graph

See final page



Appendix

Topic 1.1

Your input -> What is COMP 474, that is offered by Concordia University, about?
No problem, the description for COMP 474 at Concordia University says:
Rule-based expert systems, blackboard architecture, and agent-based. Knowledge acquisition and representation. Uncertainty and conflict resolution. Reasoning and explanation. Design of intelligent systems. Project. Lectures: three hours per week. Laboratory: two hours per week.
Prerequisite: COMP 352 or COEN 352.

Topic 1.2

Your input -> Which topics is Trenae Bryan competent in?
Sure thing, Trenae Bryan is competent in the following topics:
expertise

```
--- -----
0 Heidelberg
1 Stuart Russell
2 Diffbot
3 Harper Collins
4 Wikipedia
5 API
6 Oracle Spatial
7 GeoNames
8 ConceptNet
9 Semantic Networks
10 AI Winter
11 Layer Cake
12 Apple
13 Alfred Lennon
14 Berlin
15 Sameer
16 Microsoft
17 The Glass Palace
18 A11
19 London
20 Peter Norvig
21 YAGO
22 IRI
23 Mona Lisa
24 Neo4J
25 Concordia
26 Sir George Williams University
27 Concordia University
28 Concordia University
29 CONCORDIA UNIVERSITY
30 DBpedia
31 DBpedia Spotlight
32 DBpedia
33 Winograd
34 Terry Winograd
35 French
36 PHP
37 A12
38 IBM
39 Rumelhart
40 AI
41 Intelligent Systems
42 A Notes
43 RDF
44 Resource Description Framework (RDF)
45 FOAF
46 Discovery
47 Liyang
48 TBox
49 Computer Science
50 RDF/XML
51 WordNet
52 Léonard de Vinci
53 Leonardo da Vinci
54 SHRDLU
55 Liverpool
56 le titre
57 Natural Language Processing (NLP)
58 NLP
59 natural language processing (NLP)
60 Amazon
```


61 Prentice Hall
62 WWW
63 English language
64 English
65 XOR
66 RDF Schema
67 RDF schema
68 ttl
69 Jena
70 Canada
71 RDF triple
72 RDF Triple
73 Github
74 GitHub
75 UIMA
76 Recommender Systems
77 Knowledge Worker
78 Gene Ontology
79 Microsoft Tay
80 ML
81 Machine Learning
82 Amazon Alexa
83 Alexa
84 Deep Learning
85 Microsoft Cortana
86 Jeopardy!
87 Stanford
88 ELIZA
89 Steve Jobs
90 MIT
91 LOD
92 Dublin Core
93 McGill
94 McGill College
95 McGill University
96 McGill University
97 KNN
98 kNN
99 Concor
100 2D
101 Learning Curve
102 Naïve Bayes
103 Naive Bayes Classification
104 British
105 Enron
106 inference
107 DL
108 James Pustejovsky
109 Guantanamo Bay
110 Unsupervised
111 Unsupervised learning
112 Arthur
113 NSF
114 Pros & Cons
115 Chapter 7
116 CIA
117 Time complexity
118 Cambridge Analytica
119 Alison
120 Manhattan distance
121 False Positive
122 PDS
123 Elasticsearch
124 NuBus
125 Moodle
126 Newsgroup
127 TF-IDF
128 CAESAR
129 Christopher
130 Hamlet
131 Cambridge University Press
132 AP
133 Alag
134 BRUTUS
135 Tempest
136 John Berryman
137 Boolean model
138 IDF
139 Anthony Julius
140 CLEOPATRA
141 GUMO
142 Doug Turnbull
143 Prabhakar Raghavan
144 This week
145 Lego
146 EU
147 The Next Web

```

148 TED
149 Congress
150 thesauri
151 ACM
152 David Wood
153 TBL
154 The Artist
155 Morgan
156 loc
157 LOC
158 Unicode
159 Christian
160 Schema.org
161 Nexus
162 Uniform Resource Locator
163 ISO
164 Dewey Decimal
165 Luke
166 X5
167 Data Publishing
168 PE
169 Amsterdam
170 Milan
171 RT
172 Q5
173 RDB
174 BabelNet
175 James
176 OPE
177 Eötvös Loránd University
178 CSV
179 Springer International Publishing
180 IG
181 MusicBrainz
182 Tim Berners-Lee
183 LOD Datasets
184 Open Graph Protocol
185 Paris Hilton
186 API key
187 Quebec
188 NextProt
189 Loyola College
190 fuseki
191 Fuseki
192 Wordpress.com
193 Mexico
194 POST
195 National Cancer Institute
196 MAX
197 Amazon AWS
198 UniProt
199 QL
200 AVG
201 N-Quads
202 TriG
203 Web Ontology Language (OWL)
204 Paris
205 META tags
206 Mtl Blog
207 OpenCalais
208 JDK
209 xf

```

Topic 1.3

```

Your input -> Which subjects at Concordia University teach DBpedia?
Okay, the following courses at Concordia University that teach DBpedia are:

```

	courseName	subjectArea	courseNum	frequency
0	Intelligent Systems	COMP	474	48
1	INTRO TO A.I.	COMP	6721	

Topic 1.4

```

Your input -> What are all the courses with a COMP subject at Concordia Universit
Okay, the following courses at Concordia University that have COMP as the subject are:

```

	title	subject	courseNum
0	SELECTED TOPICS IN SOFTWARE	COMP	749
1	Techniques in Symbolic Computation	COMP	367

2	Design and Analysis of Algorithms	COMP	465
3	PATTERN RECOGNITION	COMP	6731
4	COMPUTER VISION	COMP	425
5	Project and Report	COMP	6971
6	Introduction to Software Engineering	COMP	354
7	ADV. ANALYSIS OF ALGORITHMS	COMP	7651
8	MACHINE LEARNING	COMP	6321
9	COMPUTER ARCHITECTURE	COMP	5261
10	Image Processing	COMP	478
11	NUMERIC ANALY/NONLINEAR EQUA	COMP	6361
12	Introduction to Theoretical Computer Science	COMP	335
13	ALGORITHM DESIGN TECHNIQUES	COMP	6651
14	Artificial Intelligence	COMP	472
15	Computer Science Project I	COMP	490
16	Data Analytics	COMP	333
17	MASTER S RESEARCH AND THESIS	COMP	7941
18	Computer Science Project II	COMP	492
19	PARALLEL ALGORITHMS+ARCHIT E	COMP	7241
20	PROJECT AND REPORT	COMP	6971
21	INTRO/KNOWLEDGE-BASE SYSTEMS	COMP	6591
22	ADV TOPICS MICROPROC SYSTEMS	COMP	427
23	Data Communication and Computer Networks	COMP	445
24	DOCTORAL RESEARCH AND THESIS	COMP	8901
25	SELECT TOP-DIGITAL SYSTEMS	COMP	729
26	Compiler Design	COMP	442
27	DISTRIBUTED SYSTEM DESIGN	COMP	6231
28	COMPUTER NETWORKS + PROTOCOL	COMP	6461
29	DISCRETE STR.+FORMAL LANG.	COMP	5361
30	TOOLS+TECHNIQUES / SW ENGR.	COMP	5541
31	SEL TOPICS-INFORMATION MANA	COMP	759
32	ADVANCED GAME DEVELOPMENT	COMP	6331
33	COMPUTER VISION	COMP	6341
34	Animation for Computer Games	COMP	477
35	Parallel Programming	COMP	428
36	TOPICS IN COMPUTER SCIENCE	COMP	499
37	ADVANCED PROGRAM DESIGN, C++	COMP	345
38	Computer Graphics	COMP	371
39	SEL TOPICS-COMP APPLICATIONS	COMP	779
40	MASTER S RESEARCH AND THESIS	COMP	7921
41	NATURAL LANGUAGE ANALYSIS	COMP	6751
42	SCIENTIFIC COMPUTATION	COMP	6351
43	COMP.ANAL.NATURAL LANG.TEST	COMP	690
44	Computer Architecture	COMP	326
45	INTELLIGENT SYSTEMS	COMP	6741
46	Multicore Programming	COMP	426
47	Image Processing	COMP	6771
48	ADV IMAGE PROC	COMP	7781
49	APPL./SYMBOLIC+ALGEB.COMPU N	COMP	6611
50	Object-Oriented Programming II	COMP	249
51	ADVANCED PROGRAMMING	COMP	5421
52	Program and Problem Solving	COMP	6481
53	OPERATING SYSTEMS	COMP	5461
54	Fundamentals of Programming	COMP	218
55	Computer Science Industrial Experience Reflective Learning I	COMP	108
56	DOCTORAL RESEARCH AND THESIS	COMP	890
57	GRADUATE SEMINAR-COMP.SC.	COMP	6961
58	FOUNDATIONS/SEMANTIC WEB	COMP	6531
59	COMPARAT.STUDY/PROGRAM.LANG.	COMP	6411
60	Honours Seminar	COMP	495
61	Object-Oriented Programming I	COMP	248
62	PRINCIPLES/DATA STRUCTURES	COMP	5511
63	Operating Systems	COMP	346
64	PROGRAM G + PROBLEM SOLVING	COMP	5481
65	TOPICS IN COMP. SCIENCE II	COMP	791
66	Advanced Game Development	COMP	476
67	ADV.DATABASE TECH. AND APPL.	COMP	6521
68	COMBINATORIAL ALGORITHMS	COMP	6661
69	THEORY OF COMPUTATION	COMP	6641
70	Intelligent Systems	COMP	474
71	COMBINATORICS	COMP	339
72	COMP. ORGANIZ N+ASSEMB.LANG.	COMP	5201
73	PARALLEL PROGRAMMING	COMP	6281
74	MASTER S RESEARCH AND THESIS	COMP	792
75	Bioinformatics Databases and Systems	COMP	6821
76	INFO. RETRIEVAL & WEB SEARCH	COMP	6791
77	Machine Learning	COMP	432
78	Probability and Statistics for Computer Science	COMP	233
79	SEL TOP - NUMERICAL COMPUTAT	COMP	769
80	DB SYSTEMS PRINCIPLES	COMP	7531
81	TOPICS/COMPUTER SCIENCE II	COMP	790
82	Digital Geometric Modelling	COMP	6381
83	ANIMATION FOR COMPUTER GAMES	COMP	6311
84	SEL TOP-THEORETICAL COMP SCI	COMP	739
85	Pattern Recognition	COMP	473
86	Computer Science Industrial Experience Reflective Learning II	COMP	208
87	FILES AND DATABASES	COMP	5531
88	ELEMENTARY NUMERICAL METHODS	COMP	5611

89	Elementary Numerical Methods	COMP	361
90	Databases	COMP	353
91	Principles of Programming Languages	COMP	348
92	TOPICS/COMPUTER SCIENCE	COMP	691
93	System Hardware	COMP	228
94	INTRO TO A.I.	COMP	6721
95	Introduction to Game Development	COMP	376
96	Data Structures and Algorithms	COMP	352
97	BIOINFORMATICS ALGORITHMS	COMP	6811
98	ADVANCED COMPUTER GRAPHICS	COMP	6761
99	COMPILER DESIGN	COMP	6421
100	Information Retrieval and Web Search	COMP	479
101	COMP 6781 Statistical Natural Language Processing	COMP	6781
102	Introduction to Computing	COMP	201
103	TOPICS IN COMPUTER SCIENCE	COMP	498
104	Mathematics for Computer Science	COMP	232
105	LARGE-SCALE OPTIMIZATION	COMP	6631
106	SELECTED TOPICS IN SOFTWARE	COMP	749
107	Techniques in Symbolic Computation	COMP	367
108	Design and Analysis of Algorithms	COMP	465
109	PATTERN RECOGNITION	COMP	6731
110	COMPUTER VISION	COMP	425
111	Project and Report	COMP	6971
112	Introduction to Software Engineering	COMP	354
113	ADV. ANALYSIS OF ALGORITHMS	COMP	7651
114	MACHINE LEARNING	COMP	6321
115	COMPUTER ARCHITECTURE	COMP	5261
116	Image Processing	COMP	478
117	NUMERIC ANALY/NONLINEAR EQUA	COMP	6361
118	Introduction to Theoretical Computer Science	COMP	335
119	ALGORITHM DESIGN TECHNIQUES	COMP	6651
120	Artificial Intelligence	COMP	472
121	Computer Science Project I	COMP	490
122	Data Analytics	COMP	333
123	MASTER S RESEARCH AND THESIS	COMP	7941
124	Computer Science Project II	COMP	492
125	PARALLEL ALGORITHMS+ARCHIT E	COMP	7241
126	PROJECT AND REPORT	COMP	6971
127	INTRO/KNOWLEDGE-BASE SYSTEMS	COMP	6591
128	ADV TOPICS MICROPROC SYSTEMS	COMP	427
129	Data Communication and Computer Networks	COMP	445
130	DOCTORAL RESEARCH AND THESIS	COMP	8901
131	SELECT TOP-DIGITAL SYSTEMS	COMP	729
132	Compiler Design	COMP	442
133	DISTRIBUTED SYSTEM DESIGN	COMP	6231
134	COMPUTER NETWORKS + PROTOCOL	COMP	6461
135	DISCRETE STR.+FORMAL LANG.	COMP	5361
136	TOOLS+TECHNIQUES / SW ENGR.	COMP	5541
137	SEL TOPICS-INFORMATION MANA	COMP	759
138	ADVANCED GAME DEVELOPMENT	COMP	6331
139	COMPUTER VISION	COMP	6341
140	Animation for Computer Games	COMP	477
141	Parallel Programming	COMP	428
142	TOPICS IN COMPUTER SCIENCE	COMP	499
143	ADVANCED PROGRAM DESIGN, C++	COMP	345
144	Computer Graphics	COMP	371
145	SEL TOPICS-COMP APPLICATIONS	COMP	779
146	MASTER S RESEARCH AND THESIS	COMP	7921
147	NATURAL LANGUAGE ANALYSIS	COMP	6751
148	SCIENTIFIC COMPUTATION	COMP	6351
149	COMP.ANAL.NATURAL LANG.TEST	COMP	690
150	Computer Architecture	COMP	326
151	INTELLIGENT SYSTEMS	COMP	6741
152	Multicore Programming	COMP	426
153	Image Processing	COMP	6771
154	ADV IMAGE PROC	COMP	7781
155	APPL./SYMBOLIC+ALGEB.COMPU N	COMP	6611
156	Object-Oriented Programming II	COMP	249
157	ADVANCED PROGRAMMING	COMP	5421
158	Program and Problem Solving	COMP	6481
159	OPERATING SYSTEMS	COMP	5461
160	Fundamentals of Programming	COMP	218
161	Computer Science Industrial Experience Reflective Learning I	COMP	108
162	DOCTORAL RESEARCH AND THESIS	COMP	890
163	GRADUATE SEMINAR-COMP.SC.	COMP	6961
164	FOUNDATIONS/SEMANTIC WEB	COMP	6531
165	COMPARAT.STUDY/PROGRAM.LANG.	COMP	6411
166	Honours Seminar	COMP	495
167	Object-Oriented Programming I	COMP	248
168	PRINCIPLES/DATA STRUCTURES	COMP	5511
169	Operating Systems	COMP	346
170	PROGRAM G + PROBLEM SOLVING	COMP	5481
171	TOPICS IN COMP. SCIENCE II	COMP	791
172	Advanced Game Development	COMP	476
173	ADV.DATABASE TECH. AND APPL.	COMP	6521
174	COMBINATORIAL ALGORITHMS	COMP	6661
175	THEORY OF COMPUTATION	COMP	6641

176	Intelligent Systems	COMP	474
177	COMBINATORICS	COMP	339
178	COMP. ORGANIZ N+ASSEMB.LANG.	COMP	5201
179	PARALLEL PROGRAMMING	COMP	6281
180	MASTER S RESEARCH AND THESIS	COMP	792
181	Bioinformatics Databases and Systems	COMP	6821
182	INFO. RETRIEVAL & WEB SEARCH	COMP	6791
183	Machine Learning	COMP	432
184	Probability and Statistics for Computer Science	COMP	233
185	SEL TOP - NUMERICAL COMPUTAT	COMP	769
186	DB SYSTEMS PRINCIPLES	COMP	7531
187	TOPICS/COMPUTER SCIENCE II	COMP	790
188	Digital Geometric Modelling	COMP	6381
189	ANIMATION FOR COMPUTER GAMES	COMP	6311
190	SEL TOP-THEORETICAL COMP SCI	COMP	739
191	Pattern Recognition	COMP	473
192	Computer Science Industrial Experience Reflective Learning II	COMP	208
193	FILES AND DATABASES	COMP	5531
194	ELEMENTARY NUMERICAL METHODS	COMP	5611
195	Elementary Numerical Methods	COMP	361
196	Databases	COMP	353
197	Principles of Programming Languages	COMP	348
198	TOPICS/COMPUTER SCIENCE	COMP	691
199	System Hardware	COMP	228
200	INTRO TO A.I.	COMP	6721
201	Introduction to Game Development	COMP	376
202	Data Structures and Algorithms	COMP	352
203	BIOINFORMATICS ALGORITHMS	COMP	6811
204	ADVANCED COMPUTER GRAPHICS	COMP	6761
205	COMPILER DESIGN	COMP	6421
206	Information Retrieval and Web Search	COMP	479
207	COMP 6781 Statistical Natural Language Processing	COMP	6781
208	Introduction to Computing	COMP	201
209	TOPICS IN COMPUTER SCIENCE	COMP	498
210	Mathematics for Computer Science	COMP	232
211	LARGE-SCALE OPTIMIZATION	COMP	6631

Topic 1.5

Your input -> How many students are enrolled in each course that is offered by Concordia University?

Here's the list of placeholder courses offered by Concordia University and the number of students enrolled in each one:

	subject	catalog	count
0	ACCO	220	5
1	ACCO	230	4
2	ACCO	240	6
3	ACCO	310	4
4	ACCO	320	4
5	ACCO	330	3
6	ACCO	340	6
7	ACCO	350	1
8	ACCO	355	6
9	ACCO	360	3
10	ACCO	365	6
11	ACCO	400	5
12	ACCO	420	4
13	ACCO	425	6
14	ACCO	430	3
15	ACCO	435	4
16	ACCO	440	8
17	ACCO	450	3
18	ACCO	455	5
19	ACCO	465	7
20	ACCO	470	2
21	ACCO	471	2
22	ACCO	495	2
23	ACCO	590	4
24	ACCO	595	6
25	ACCO	600	17
26	ACCO	601	4
27	ACCO	602	11
28	ACCO	603	5
29	ACCO	604	3
30	ACCO	605	8
31	ACCO	606	5
32	ACCO	607	2
33	ACCO	608	7
34	ACCO	609	4
35	ACCO	631	6
36	ACCO	631T	2
37	ACCO	635	5
38	ACCO	635T	3
39	ACCO	643X	6

40	ACCO	650	2
41	ACCO	650T	11
42	ACCO	651	4
43	ACCO	651T	6
44	ACCO	652	5
45	ACCO	652T	3
46	ACCO	653	4
47	ACCO	653T	5
48	ACCO	654	5
49	ACCO	654T	10
50	ACCO	655	3
51	ACCO	655T	4
52	ACCO	656	6
53	ACCO	656T	5
54	ACCO	657	3
55	ACCO	657T	8
56	ACCO	658	7
57	ACCO	658T	1
58	ACCO	659	4
59	ACCO	659T	3
60	ACCO	672	8
61	ACCO	681	3
62	ACCO	682	3
63	ACCO	685	5
64	ACCO	690B	5
65	ACCO	691	6
66	ACCO	692	6
67	ACCO	695	6
68	ACTT	201	8
69	ACTT	202	6
70	ACTT	209	9
71	ACTT	210	9
72	ACTT	211	7
73	ACTT	231	9
74	ACTT	298	3
75	ACTT	299	2
76	ACTT	321	8
77	ACTT	325	10
78	ACTT	331	5
79	ACTT	332	6
80	ACTT	355	2
81	ACTT	358	18
82	ACTT	360	11
83	ACTT	370	5
84	ACTT	372	3
85	ACTT	398	7
86	ACTT	399	5
87	ACTT	432	7
88	ACTT	433	9
89	ACTT	434	9
90	ACTT	435	9
91	ACTT	436	11
92	ACTT	437	7
93	ACTT	438	9
94	ACTT	440	10
95	ACTT	450	9
96	ACTT	455	7
97	ACTT	458	5
98	ACTT	460	10
99	ACTT	461	5

Topic 1.6

Your input -> What courses are worth 4.0 credits at Concordia University?

Here's the list of courses offered by Concordia University that are worth 4.0 credits:

	title	subject	courseNum	credit
0	NONLINEAR SYSTEMS	ENGR	6141	4
1	TUTORIAL IN INF SYS/INT.CONT	ACCO	603	4
2	CAPSTONE AEROSPACE ENGINEERING DESIGN PROJECT	AERO	490	4
3	HEAT EXCHANGER DESIGN	MECH	6141	4
4	Introduction to Flight and Aerospace System	AERO	201	4
5	SPEC MASTER'S LEVEL STUDIES	SPEC	644	4
6	VLSI Circuit Design	COEN	451	4
7	PATTERN RECOGNITION	COMP	6731	4
8	COMPUTER VISION	COMP	425	4
9	MICROTRANSDUCER PROCESS TECH	ELEC	6251	4
10	ANALYTICAL METH ECOTOXICOLOG	CHEM	618	4
11	Building Information Modelling in Construction	BLDG	6241	4
12	Project and Report	COMP	6971	4
13	READING COURSE IN ALGEBRA	MATH	697	4
14	VIBR. PROB. IN ROTAT. MACH.	MECH	6301	4
15	SYSTEMS REQMT. SPECIFICATION	SOEN	6481	4

16	Corrosion and Oxidation of Metals	MECH	6571	4
17	Advanced Functions in R	GPDI	547	4
18	JOIN G PROC+NONDESTRUC.TEST.	MECH	6541	4
19	The Finite Element Method in Computational Fluid Dynamics	ENGR	6261	4
20	VLSI PROCESS TECHNOLOGY	ELEC	6241	4
21	MODEL./BLDG.+ENVIRON L ENGG.	CIVI	6601	4
22	SPEC DOCTORAL LEVEL STUDIES	SPEC	840	4
23	Distributed Systems	SOEN	423	4
24	ENGINEERING ANALYSIS	ENCS	6021	4
25	VIRTUAL SYSTEMS	MECH	6041	4
26	HEAT TRANSFER	BLDG	6541	4
27	ENGG.ASPECTS/SITE REMEDIA N.	CIVI	6491	4
28	ENG. FRACTURE MECH.+FATIGUE	MECH	6641	4
29	ADVANCED COLLOID AND INTERFACE SCIENCE AND ENGINEERING	CHME	6131	4
30	INTRO TO TRIBOLOGY	MECH	6431	4
31	SUSTAINABLE INFRASTRUCTURE	INSE	6311	4
32	Introduction to Software Engineering	COMP	354	4
33	ADV. ANALYSIS OF ALOGARITHMS	COMP	7651	4
34	BUSINESS ADVISORY SERVICES	ACCO	631	4
35	INTRODUCTION TO ANALOG VLSI	ELEC	6051	4
36	AUTONOMY FOR MOBILE ROBOTS	ENGR	6412	4
37	PROCESS DYNAMICS+CONTROL	MECH	6051	4
38	HYBRID ELECTRIC VEHICLE POWER SYSTEM DESIGN AND CONTROL	ELEC	6471	4
39	Taxation and Decision-Making	ACCO	655	4
40	LEAN MANUFACTURING	INDU	6241	4
41	ADV. CONCEPTS/QUALITY IMPR.	INDU	6341	4
42	MACHINE LEARNING	COMP	6321	4
43	Tutorial in Performance Management	ACCO	656T	4
44	SOLAR BUILDING MODELLING AND DESIGN	BLDG	6951	4
45	Image Processing	COMP	478	4
46	STRESS ANALYSIS/MECH DESIGN	MECH	6441	4
47	The Finite Element Method in Structural Mechanics	ENGR	6531	4
48	NUMERIC ANALY/NONLINEAR EQUA	COMP	6361	4
49	Facilities Planning and Warehouse Operations	INDU	6251	4
50	Financial Strategies and Decisions	ACCO	657	4
51	SVCS COM: FOUND, DSGN & IMPL	SOEN	6861	4
52	Tutorial in Capstone II Examination	ACCO	609	4
53	INDUSTRIALIZED BUILDING	BLDG	6641	4
54	INDOOR AIR QUAL.+ VENT.	BLDG	6751	4
55	VLSI CIRCUIT DESIGN	COEN	6511	4
56	AVIONIC SYSTEMS DESIGN	ENGR	7461	4
57	SELECTED TOP-INORGANIC CHEM	CHEM	647	4
58	DESIGN OF TRANSPORTATION TERMINALS	CIVI	7401	4
59	MEDICAL IMAGE PROCESSING	ELEC	6661	4
60	CONSTRUCTION PROCESSES	BLDG	6831	4
61	Tutorial in Performance Management	ACCO	606	4
62	ALGORITHM DESIGN TECHNIQUES	COMP	6651	4
63	KINETIC THEORY OF GASES	MECH	6101	4
64	MECHANICS+BIOL. TISSUES	MECH	6361	4
65	OCCUPATIONAL SAFETY ENG.	INDU	6421	4
66	PRIN. OF SLID ST NA.DEV	ELEC	6281	4
67	Artificial Intelligence	COMP	472	4
68	SCHEDULING THEORY	INDU	6231	4
69	DECISION ANALYSIS	BLDG	6581	4
70	INFO. THEORY + SOURCE CODING	ELEC	6151	4
71	PROJECT ACQUISITION+CONTROL	BLDG	7811	4
72	Tutorial in Taxation/Decision making	ACCO	605	4
73	TRANS. SYSTEMS ANALYSIS	CIVI	6401	4
74	SPECIAL TOPIC: CELL BIOLOGY	SPEC	843	4
75	INFORMATION TECHNOLOGY APPLICATIONS IN CONSTRUCTION	BLDG	7841	4
76	MICROWAVE ENGINEERING	ELEC	6391	4
77	DEVELOPMENT & GLOBAL ENGR.	ENCS	6821	4
78	INFORMATION SYSTEMS SECURITY CYBERCRIME INVESTIGATION	INSE	6610	4
79	MODAL ANALYSIS/MECH.SYSTEMS	MECH	6351	4
80	SPEC MASTER'S LEVEL STUDIES	SPEC	649	4
81	LOGISTICS NETWORK MODELS	INDU	6141	4
82	TWO-DIMEN'AL SIG & IMAGE PRO	ELEC	6641	4
83	SYSTEM RELIABILITY	INDU	6351	4
84	Embedded Systems and Software Design	COEN	421	4
85	OPT.NETWK: ARCH. & PROTOCOLS	ENCS	6811	4
86	TRUSTED COMPUTING	INSE	6650	4
87	PARALLEL ALGORITHMS+ARCHIT E	COMP	7241	4
88	Smart Grids and Control System Security	INSE	6640	4
89	DISCRETE OPTIMIZATION	INDU	6361	4
90	SOFTWARE RE-ENGINEERING	SOEN	6021	4
91	PLAN.+ DESIGN OF BRIDGES	CIVI	6101	4
92	EMBEDDED SYSTEM MODELLING	COEN	6341	4
93	LEAN ENTERPRISE	INDU	6221	4
94	SPEC MASTER'S LEVEL STUDIES	SPEC	652	4
95	WIRELESS NETWORK SECURITY	INSE	6190	4
96	SELECTED TOP:ECOTOXICOLOGY I	BIOL	572	4
97	ADVANCED MATERIALS	MECH	6501	4
98	BUILDING ILLUMINATION	BLDG	6731	4
99	COMP.AIDED BUILD. DESIGN	BLDG	6591	4

Topic 1.7

Your input -> What are the topics of COMP 474 at Concordia University?
label

```
-----  
0 Heidelberg  
1 Stuart Russell  
2 Diffbot  
3 Harper Collins  
4 Wikipedia  
5 API  
6 Oracle Spatial  
7 GeoNames  
8 ConceptNet  
9 Semantic Networks  
10 AI Winter  
11 Layer Cake  
12 Apple  
13 Alfred Lennon  
14 Berlin  
15 Sameer  
16 Microsoft  
17 The Glass Palace  
18 A11  
19 London  
20 Peter Norvig  
21 YAGO  
22 IRI  
23 Mona Lisa  
24 Neo4J  
25 Concordia  
26 Sir George Williams University  
27 Concordia University  
28 Concordia University  
29 CONCORDIA UNIVERSITY  
30 DBpedia  
31 DBpedia Spotlight  
32 DBpedia  
33 Winograd  
34 Terry Winograd  
35 French  
36 PHP  
37 A12  
38 IBM  
39 Rumelhart  
40 AI  
41 Intelligent Systems  
42 A Notes  
43 RDF  
44 Resource Description Framework (RDF)  
45 FOAF  
46 Discovery  
47 Liyang  
48 TBox  
49 Computer Science  
50 RDF/XML  
51 WordNet  
52 Léonard de Vinci  
53 Leonardo da Vinci  
54 SHRDLU  
55 Liverpool  
56 le titre  
57 Natural Language Processing (NLP)  
58 NLP  
59 natural language processing (NLP)  
60 Amazon  
61 Prentice Hall  
62 WWW  
63 English language  
64 English  
65 XOR  
66 RDF Schema  
67 RDF schema  
68 ttl  
69 Jena  
70 Canada  
71 RDF triple  
72 RDF Triple  
73 Github  
74 Github  
75 UIMA  
76 Recommender Systems  
77 Knowledge Worker  
78 Gene Ontology  
79 Microsoft Tay
```

80 ML
81 Machine Learning
82 Amazon Alexa
83 Alexa
84 Deep Learning
85 Microsoft Cortana
86 Jeopardy!
87 Stanford
88 ELIZA
89 Steve Jobs
90 MIT
91 LOD
92 Dublin Core
93 McGill
94 McGill College
95 McGill University
96 McGill University
97 KNN
98 kNN
99 Concor
100 2D
101 Learning Curve
102 Naive Bayes
103 Naive Bayes Classification
104 British
105 Enron
106 inference
107 DL
108 James Pustejovsky
109 Guantanamo Bay
110 Unsupervised
111 Unsupervised learning
112 Arthur
113 NSF
114 Pros & Cons
115 Chapter 7
116 CIA
117 Time complexity
118 Cambridge Analytica
119 Alison
120 Manhattan distance
121 False Positive
122 PDS
123 Elasticsearch
124 NuBus
125 Moodle
126 Newsgroup
127 TF-IDF
128 CAESAR
129 Christopher
130 Hamlet
131 Cambridge University Press
132 AP
133 Alag
134 BRUTUS
135 Tempest
136 John Berryman
137 Boolean model
138 IDF
139 Anthony Julius
140 CLEOPATRA
141 GUMO
142 Doug Turnbull
143 Prabhakar Raghavan
144 This week
145 Lego
146 EU
147 The Next Web
148 TED
149 Congress
150 thesauri
151 ACM
152 David Wood
153 TBL
154 The Artist
155 Morgan
156 loc
157 LOC
158 Unicode
159 Christian
160 Schema.org
161 Nexus
162 Uniform Resource Locator
163 ISO
164 Dewey Decimal
165 Luke
166 X5


```

167 Data Publishing
168 PE
169 Amsterdam
170 Milan
171 RT
172 Q5
173 RDB
174 BabelNet
175 James
176 OPE
177 Eötvös Loránd University
178 CSV
179 Springer International Publishing
180 IG
181 MusicBrainz
182 Tim Berners-Lee
183 LOD Datasets
184 Open Graph Protocol
185 Paris Hilton
186 API key
187 Quebec
188 NextProt
189 Loyola College
190 Fuseki
191 Fuseki
192 Wordpress.com
193 Mexico
194 POST
195 National Cancer Institute
196 MAX
197 Amazon AWS
198 UniProt
199 QL
200 AVG
201 N-Quads
202 Trig
203 Web Ontology Language (OWL)
204 Paris
205 META tags
206 Mtl Blog
207 OpenCalais
208 JDK
209 xf

```

Topic 1.8

Your input -> Which students have retaken the same course at least 2 times?

Here's all students that have retaken a course at least 2 times:

	subjectArea	catalog	firstName	lastName	studentId	nbTimesTaken
0	AHSC	330	Breia	Crowell	43248687	2
1	ANTH	270	Sanya	Ray	41103045	2
2	ANTH	345	Sinead	Thomas	47855211	2
3	ANTH	472	Danee	Lam	41687401	2
4	SOCI	472	Danee	Lam	41687401	2
5	ARTH	200	Tiwanna	Phelps	42266030	2
6	ARTH	266	Romy	Spence	43970807	2
7	ATRP	624	Keane	Lowry	45656225	2
8	BIOL	227	Brandelyn	Williford	46414172	2
9	BIOL	350	Mahmoud	Scarborough	44328251	2
10	BIOL	351	Lorilei	Bishop	47062293	2
11	BLDG	365	Sheren	Mitchell	43177841	2
12	BLDG	6071	Evalina	Bruce	44111281	2
13	CART	212	Stepahnie	Bradford	48779825	2
14	CHEM	221	Therron	Brandon	49621189	2
15	CIVI	432	Jameca	Golden	49370084	2
16	CIVI	483	Sherard	Gilliam	47931566	2
17	COEN	313	Brandelyn	Williford	46414172	2
18	COEN	313	Gladis	Frazier	49832947	2
19	COMP	249	Leshay	Marks	43331314	2
20	COMP	346	Sarkis	Peele	49107786	2
21	COMP	445	Linsday	Petersen	42884783	2
22	COMP	5481	Viliani	Boyette	41656779	2
23	COMS	240	Agustine	Alexander	41630765	2
24	COMS	370	Stevi	Dunn	48964072	2
25	COMS	695B	Teressa	Manning	41358236	2
26	COMS	861	Lacye	Yu	43152116	2
27	DANC	301	Justeen	Moon	49857777	2
28	ECON	615	Zachariah	Braswell	49092469	2
29	ECON	662	Hollyann	Sutton	43446352	2
30	ELEC	442	Jaquitta	Cobb	46215613	2
31	ENGL	384	Serena	Raynor	47414185	2
32	ENGL	441	Charese	Wood	44351512	2

33	ENGL	451	Joann	Ivey	44523268	2
34	ENGL	646	Shunda	May	49777638	2
35	ENGR	6411	Cherita	Herndon	41217532	2
36	ESTU	608	Venessa	Brantley	46985710	2
37	ETEC	536	Su	Dickens	45922911	2
38	ETEC	640	Jessieca	Rodriguez	44346566	2
39	ETEC	650	Dustyn	Brennan	43478189	2
40	EXCI	460	Adrienne	Brooks	41354838	2
41	FINA	320	Lavanda	Mathews	45650811	2
42	FLIT	230	Emmanuelle	Hurley	43248110	2
43	FLIZ	230	Emmanuelle	Hurley	43248110	2
44	FPST	297	Garrett	Morris	49501430	2
45	FRAN	215	Rami	Hull	44448879	2
46	FTRA	202	Nicholai	Yates	43988012	2
47	GEOL	210	Robertson	Swanson	49670104	2
48	GERM	270	Dewan	Connor	48636591	2
49	GERM	305	Orrin	Porter	42867964	2
50	HIST	201	Nickolaus	Wyatt	45946783	2
51	HISZ	201	Nickolaus	Wyatt	45946783	2
52	HIST	235	Keishawna	Morrison	49661907	2
53	HIST	277	Takara	Nolan	41477344	2
54	HIST	281	Jonisha	Pridgen	48300318	2
55	HISZ	281	Jonisha	Pridgen	48300318	2
56	HIST	340	Tho	Christian	43356669	2
57	HIST	365	Kyron	Adkins	46982724	2
58	HUMA	863	Kavita	Kuhn	47032123	2
59	INDU	490	Gertrude	Middleton	46328769	2
60	IRST	203	Jesselyn	Waller	46953764	2
61	MECH	311	Adaliz	Mullins	46076353	2
62	PHIL	609	Tyreka	Perez	43713212	2
63	POLI	216	Sheretta	Hampton	49097045	2
64	POLI	409	Courteney	Dickson	45967499	2
65	POLI	426	Vien	Rao	46187290	2
66	POLI	600	Loren	Godfrey	43303362	2
67	POLI	607	Yasir	Riggs	49074971	2
68	PSYC	250	Robertson	Swanson	49670104	2
69	PSYC	444	Omarr	Wilkins	46167225	2
70	PSYC	487	Terrall	Blake	42256310	2
71	PSYC	495	Rosalva	Rodgers	43147943	2
72	PSYC	801	Taquita	Creech	44602117	2
73	PSYC	823	Toy	Maynard	40188854	2
74	RELI	209	Jaquilla	Gorman	42935367	2
75	RELI	366	Sherlyn	Vaughn	47188616	2
76	SCUL	490	Colena	Russell	47761423	2
77	SOCI	203	Audrey	Starr	41164798	2
78	SOCZ	203	Audrey	Starr	41164798	2
79	ANTH	276	Taiwo	Atkins	48183647	2
80	SOCI	276	Taiwo	Atkins	48183647	2
81	ANTH	381	Rashi	Schmidt	45112117	2
82	SOCI	381	Rashi	Schmidt	45112117	2
83	SOEN	228	Cornelious	Locklear	45251717	2
84	SOEN	490	Wanda	Mills	47201164	2
85	SPEC	601	Odette	Lynn	47693867	2
86	SPEC	835	Truman	Brady	40180367	2
87	STAT	250	Smita	Chan	45431677	2
88	TESL	324	Kima	Sanchez	46226538	2
89	TESL	486	Travell	West	46861855	2
90	THEO	236	Avalon	Sanders	46978272	2
91	THEO	322	Brean	Bullock	49980093	2
92	TRES	582	Celicia	Carr	47840304	2
93	CEWD	229	Kirsten	Simon	42444526	2
94	COMS	694	Glen	Snyder	48082836	2
95	ELEC	6391	Chalea	Kearney	45333591	2
96	ETEC	593K	Alacia	Dudley	46255616	2
97	HIST	225	Traniece	Donovan	48612768	2
98	INDI	801	Billyjoe	Barnes	44377786	2
99	INDI	829	Nadja	Potter	42076872	2
100	MECH	6251	Curran	Burgess	40159965	2
101	MUSI	472	Titania	Weaver	44790118	2
102	PSYC	850C	Pessy	Heller	46608061	2
103	RELI	601B	Tanara	Berman	41081117	2
104	ACCO	653T	Tyanne	Miller	41754691	2
105	ADED	489	Myishia	Singer	48519905	2
106	ARTH	803	Sharisse	Chase	49819684	2
107	CHST	625	Davy	Snow	48167830	2
108	EXCI	493	Carlus	Faulkner	45782429	2
109	FMST	332	Raniesha	Wilkinson	47083256	2
110	FMST	610	Analissa	Kim	46070927	2
111	INTE	298	Hadley	Klein	45522578	2
112	LIBS	498	Berta	Capps	44951559	2
113	POLI	499	Lawerence	Fisher	43036372	2
114	PSYC	228	Sherley	Shepherd	41407134	2
115	SCPA	298	Pa	Carlson	41075698	2
116	TDEV	398	Leandrea	Howe	41397747	2
117	HISW	205	Cedar	McBride	49538341	2
118	HISW	251	Gus	Rosen	42871831	2
119	INDI	639B	Darril	Barnett	48541329	2

120	FBRS	386	Rami	Hull	44448879	2
121	ELEC	367	Jaamal	McNamara	42004164	2
122	PERC	209	Chalon	Monroe	43045045	2
123	PERC	498	Nichlos	Forrest	46504129	2
124	FTRA	638	Kima	Sanchez	46226538	2
125	COMP	6331	Lyle	McAllister	49376844	2
126	GPTK	714	Travers	Lawrence	41871544	2
127	COMS	484	Brean	Bullock	49980093	2
128	GEOG	264	Ellena	Stanton	43729289	2
129	GPLL	38	Trenae	Bryan	44166698	2
130	SSOQ	609	Hobie	Johnson	47747097	2
131	BIOL	476	Sheren	Mitchell	43177841	2
132	COMP	432	Latavia	Harrell	43119582	2
133	INDU	6521	Kirsten	Simon	42444526	2
134	MIAE	221	Shonika	Duncan	42720631	2
135	CEPS	1105E0	Kellis	Davies	44331863	2
136	ACCO	220	Artisha	Anderson	47842519	1
137	ACCO	220	Jemaine	Roach	49453432	1
138	ACCO	220	Jodi	Scott	47495787	1
139	ACCO	220	Karlyn	Merrill	41588547	1
140	ACCO	220	Karra	Boyer	49004841	1
141	ACCO	230	Claudy	Rosenthal	41918453	1
142	ACCO	230	Lily	Welsh	44331134	1
143	ACCO	230	Pierce	Moran	41623212	1
144	ACCO	230	Roxana	Hawkins	41221982	1
145	ACCO	240	Bernadette	Bradley	45836201	1
146	ACCO	240	Gabriel	Browning	48317725	1
147	ACCO	240	Keidra	Lawson	48350817	1
148	ACCO	240	Lyndsi	Braun	40771970	1
149	ACCO	240	Shanette	McDaniel	42090163	1

Topic 1.9

Your input -> Which students have failed SOCI 336 at Concordia University
Here's all students that have failed SOCI 336 at Concordia University:

firstName	lastName	studentId	subjectArea	catalog	grade
0	Mariela	Morrow	43952942	SOCI	336 F

Topic 1.10

Your input -> What is COMP 474, that is offered by Concordia University, about?

No problem, the description for COMP 474 at Concordia University says:

Rule-based expert systems, blackboard architecture, and agent-based. Knowledge acquisition and representation. Uncertainty and conflict resolution. Laboratory: two hours per week.

Prerequisite: COMP 352 or COEN 352.

Topic 2.1

see topic 1.1 - 1.10

Topic 2.2

see topic 1.1

Topic 2.3

Your input -> Which topics are covered in worksheet 5 of COMP 6721?

These are the topics covered in worksheet 5 of COMP 6721:

topicLabel	resourceURI
0 XOR	C:/Users/Admin/PycharmProjects/unibot/Data/Lectures/COMP6721/Worksheets/worksheet05.pdf
1 neuron	C:/Users/Admin/PycharmProjects/unibot/Data/Lectures/COMP6721/Worksheets/worksheet05.pdf
2 Perceptron	C:/Users/Admin/PycharmProjects/unibot/Data/Lectures/COMP6721/Worksheets/worksheet05.pdf
3 Delta	C:/Users/Admin/PycharmProjects/unibot/Data/Lectures/COMP6721/Worksheets/worksheet05.pdf
4 Alison	C:/Users/Admin/PycharmProjects/unibot/Data/Lectures/COMP6721/Worksheets/worksheet05.pdf

Topic 2.4

see topic 1.3