Week 13
Review for Final Exam

Week 2 – Spatial database

- What we will cover
  - Spatial Data Types and Modelling
    - Point data, line data, polygon data
  - Spatial Relationships, Operations and Queries
    - Spatial topological relationship; polygon intersection matrix *(some examples can be found from tutorial)*
  - SDBMS Architectures
- Goals
  - Understand how spatial data is different from the relational data
  - Understand how these differences affect those relational techniques we learned before
  - Understand what a SDBMS is

Week 3 & 4 – Spatial data organization (Data Access Methods)

- One dimensional
  - Hashing and B-Trees
- Line Data
  - Segment Tree, Interval Tree
- Point data
  - Hashing: GRID and EXCELL
  - Hierarchical
    - Quadtree: point and region quadtrees
    - kd-Tree
      - No need to focus on too detailed operations, instead, try to fundamentally understand them
    - Z-values and B-tree
- Polygon data
  - Transformation: End point mapping and z-values
    - how to index an interval via endpoint mapping;
    - how to perform queries using it (three query types)
  - Overlapping: R-tree ~~and R*-tree~~
  - Clipping: R^+-tree
    - how to use them for indexing; what is the motivation of R+-tree; their differences/commons

Week 5 – Spatial Query Processing 1

- What we will cover
  - The filter-and-refine approach
    - The basic idea, the two-step framework
  - Some basic computational geometry algorithms
    - Point in Rectangle
    - Rectangle intersection
    - Point in Polygon
    - Polyline intersection
    - Polygon intersection
  - Intersection join algorithms using various spatial indexes
  - Efficient processing of some advanced spatial queries
    - How to make use of the filter-and-refine framework for efficiency

Week 6 – Spatial Query Processing 2

- Nearest Neighbor
  - K-NN
  - R-Tree - NN
  - Pruning Strategies
  - KNN BaB, KNN BF
  - Reverse-NN

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- Skyline queries
  - Monotonically Increasing Functions
  - Skyline for Top-1
  - Skyline Block Nested Loop
  - Skyline with NN
  - Branch and Bound Skyline (BBS)

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Week 8 – Managing Spatiotemporal Data

- Trajectory similarity measures
  - Lock-Step Alignment
  - Adaptive Alignment
    - DTW
  - Count-Based Similarity
    - LCSS: count the similar sample pairs
    - EDR: count the dissimilar sample pairs
      - specific questions have been discussed in tutorial, like how to manually compute the LCSS/EDR similarity for two given strings
  - Continuous measures Similarity
    - Consider the line segments between samples
    - OWD
    - LIP
  - Spatiotemporal Distances
    - SED
- Open issues and directions
  - Trajectory analytics

Week 8 – Managing Spatiotemporal Data

- Spatiotemporal data and queries
  - The Temporal Dimension
  - Spatiotemporal Data
    - Trajectory Data
      - the definition, properties, differences with other types of data
    - Applications
  - Spatiotemporal Data Management
  - Spatiotemporal Queries
    - Continuous NN Query
- Spatiotemporal indexing and query processing
  - 3D R-Tree, HR-Tree, TPR-Tree
    - the corresponding characteristics, their differences/commons or pros/cons

Week 9 – Managing high-D data

- Motivation
  - Examples
  - Why
    - index vs. linear scan
    - curse of dimensionality *(some discussions are also included in that week's tutorial)*
  - What to expect
- Technique
  - X-Tree
  - Pyramid
    - how to compute pyramid value: $pv_v = i + h_v$
    - how to perform point/range queries
  - VA-File
  - iDistance
    - the range of Nearest Neighbour (NN) search
  - Other techniques
- Summary

Week 10 – Multimedia database

- To understand what is Multimedia Databases
- To learn abstraction (feature representations) of MM
  - How to abstract an image via colour histogram
- To search in MM database (content-based retrieval)
  - The process of image retrieval
    - feature-based similarity measure
  - Evaluation: precision and recall *(relevant questions have been discussed in tutorial)*
    - Definition, detailed computation, their relationship, how to improve them

Week 11 – Route Planning in Road Network

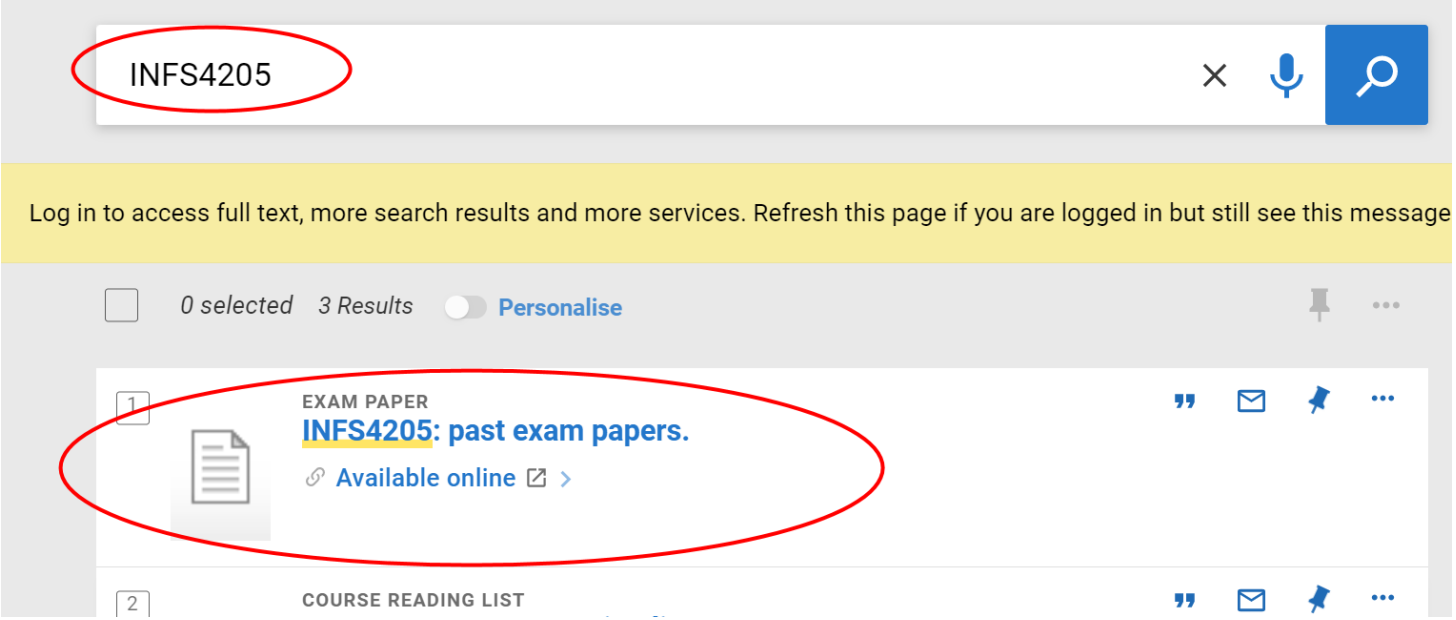
- Background & Path Problems
  - Shortest path query
- Index-Free Algorithms
  - Dijkstra's Algorithms and Its Variations
  - Goal Directed Based Methods
- Index-Based Algorithms
  - Online Search Index Methods
  - Hop Based Methods

Prepare for the Exam

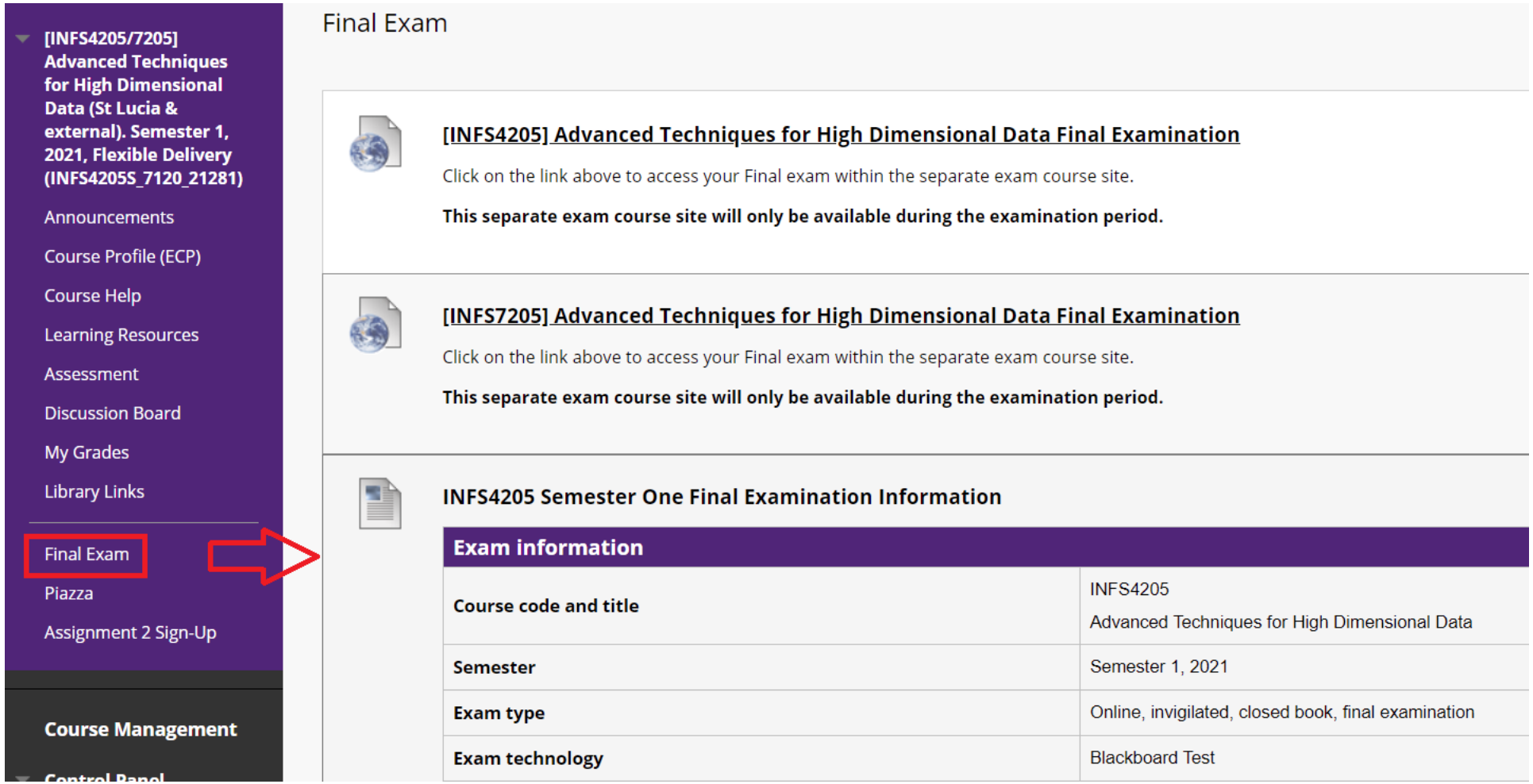
- Exam scope and format
  - Blackboard Test with ProctorU
  - Entire course, excluding Week 12 Lecture
  - Close-book, 120 + 10 minutes, 50 marks
  - “Double Pass”
    - At least 50 marks in total and at least 25 marks in the final exam, to pass this course

Prepare for the Exam

- Resources you can use
  - Lecture slides
  - Tutorial sheet
  - Past exam papers: search ‘INFS4205’ or ‘INFS7205’ in UQ library.



Final Exam


[INFS4205/7205] Advanced Techniques for High Dimensional Data (St Lucia & external). Semester 1, 2021, Flexible Delivery (INFS4205S_7120_21281)
Announcements
Course Profile (ECP)
Course Help
Learning Resources
Assessment
Discussion Board
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Library Links
Final Exam
Piazza
Assignment 2 Sign-Up
Course Management
Final Exam
[INFS4205] Advanced Techniques for High Dimensional Data Final Examination
Click on the link above to access your Final exam within the separate exam course site.
This separate exam course site will only be available during the examination period.
[INFS7205] Advanced Techniques for High Dimensional Data Final Examination
Click on the link above to access your Final exam within the separate exam course site.
This separate exam course site will only be available during the examination period.
INFS4205 Semester One Final Examination Information
Exam information
Course code and title
INFS4205
Advanced Techniques for High Dimensional Data
Semester
Semester 1, 2021
Exam type
Online, invigilated, closed book, final examination
Exam technology
Blackboard Test

Exam Information

Exam information	
Course code and title	INFS4205 Advanced Techniques for High Dimensional Data
Semester	Semester 1, 2021
Exam type	Online, invigilated, closed book, final examination
Exam technology	Blackboard Test
Exam date and time	Refer to your personal exam timetable for the scheduled date and time of this exam. The examination duration from the time your proctor starts your examination will be: 2 hours 10 minutes including 10 minutes reading time..
Exam window	At the time selected by you within the scheduled exam window, you will be required to connect to ProctorU. After an on-boarding process, your proctor will start the exam. You will then have the duration of the exam listed to complete your exam. **Please note**: It may take up to 30 minutes to connect you with a proctor, however your exam timer does not start until your proctor starts your exam. After an exam is started, you will have the duration of the exam to complete and submit your response. **Please note:** You will not be able to access the examination after this time.
Permitted materials	The recommended materials are listed below. Any calculator permitted - unrestricted.
Recommended materials	Ensure the following materials are available during the exam: Water bottle; unrestricted number of blank working paper
Instructions	You need to answer all of the questions in the Blackboard Test.

Exam Information

Who to contact	Given the nature of this examination, responding to student queries and/or relaying corrections to exam content during the exam may not be feasible. At the end of the exam there will be a free text box field. Please use this to specify any assumptions you have made in completing the exam and which questions those assumptions relate to. You may also include queries you may have made with respect to a particular question, should you have been able to 'raise your hand' in an examination room. If you experience any technical difficulties when connected to an invigilator, talk to your online invigilator via the webcam or chat functions. If the technical trouble cannot be resolved, you should ask for an email (or transcript of the chat) documenting any technical advice provided to support your request for a deferred exam. If your invigilator advises you to contact UQ or you experience any technical difficulties when not connected to an invigilator, contact the Library AskUs service for advice as soon as practicable: **Chat:** support.my.uq.edu.au/app/chat/chat_launch_lib **Phone:** +61 7 3506 2615 **Email:** examsupport@library.uq.edu.au You should also ask for an email documenting the advice provided so you can provide this to the course coordinator immediately at: h.yin1@uq.edu.au
Important exam condition information	Academic integrity is a core value of the UQ community and as such high academic integrity expectations apply to all examinations, whether undertaken face-to-face or online. This means: • You are not permitted to access any online or hard copy resources during this closed book exam, and hence you cannot cut-and-paste material other than your own work as answers. • You are not permitted to consult any other person – whether directly, online, or through any other means – about any aspect of this examination during the period that it is available. • If it is found that you have given or sought outside assistance with this examination, then that will be deemed to be cheating. Undertaking this online examination deems your commitment to UQ's academic integrity pledge as summarised in the following declaration: *"I certify that I have completed this examination in an honest, fair and trustworthy manner, that my submitted answers are entirely my own work, and that I have neither given nor received any unauthorised assistance on this examination".*

Exam Information

- **Format**: Multiple-choice questions (MCQ) and short-answer questions. There are 5 MCQ questions, and each question is assigned 2 marks. There are 6 groups of short-answer questions with the total marks 40. Each group contains 2-4 subquestions.
- Repeated submissions **will not be allowed**. Once you submit your answers, you cannot go back to the exam.
- Please click **Save** once you finish each question in case of any unforeseen technical problem.
- This test will **save and submit automatically** when the time expires.
- This test **can be saved and resumed** at any point until time has expired. The timer will continue to run if you leave the test.

Thanks, and All the Best!