Final Review

ENGN 6528

Final Review

- Exam information
- Review

Exam Info

- (15% + 15% + 20%) (Lab-assignment) + 20% (mid-term) = 70%
- Final Exam: 30%
- Final exam format: Timed exam, 3:00pm (Canberra time) on June 7th, 2021
- You will be given extra time to download the exam papers and upload your answers.

Exam Info

- It is a timed open book exam. You need to work on exam questions by yourself. We will use turnitin to check your final answer report.
- We will release detailed exam instructions before the exam and the answer format to the exam.

Exam question types

The exam includes questions on

- Basic concepts & analysis
- Basic calculation
- Basic algorithm design & analysis

Basic concepts [quiz-Q1]

Q1: (10 marks) [basic concepts]

Answer the following questions concisely. Each of the questions must be answered in no more than 5 lines of text. Longer answers will be penalized.

(1) Consider the HSV colour space. What does H, S and V stand for ?
Based on the HSV colour representation, what is the main difference between a "red" colour and a "pink" colour ?

(2) What does SIFT stand for ?

Basic calculation [quiz-Q3]

Q3: (15 marks) [basic calculations]

Consider the 5×5 image below. The pixel grey values are indicated by the values in the cells.

3	2	1	2	4
2	1	3	200	3
6	7	8	7	9
8	100	6	6	7
7	9	6	8	8

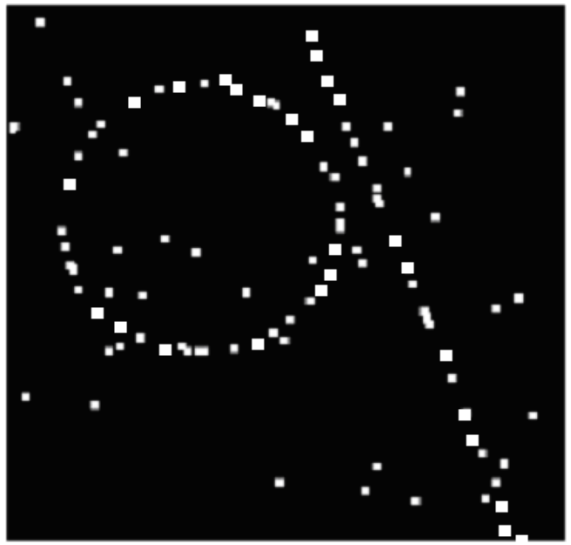
Apply a 3×3 median filter to the image. Note that to avoid problems at the edges of the image you only need to calculate the filtered values for the central 3×3 region.

Apply the vertical edge filter used by the Sobel edge detector to the image above. Again, you only need to calculate the results for the central 3×3 region.

Basic algorithm design & analysis (quiz-Q5)

Q5: (15 marks) [basic design problem]

Given below is an input binary image. You are asked to design an algorithm that can extract the circle in it. You need to estimate all the parameters of the circle.



(i) Please outline your algorithm briefly.

Basic algorithm design & analysis (quiz-Q5)

Q5: (15 marks) [basic design problem]

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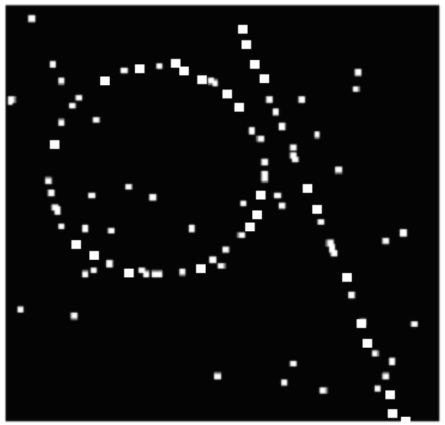
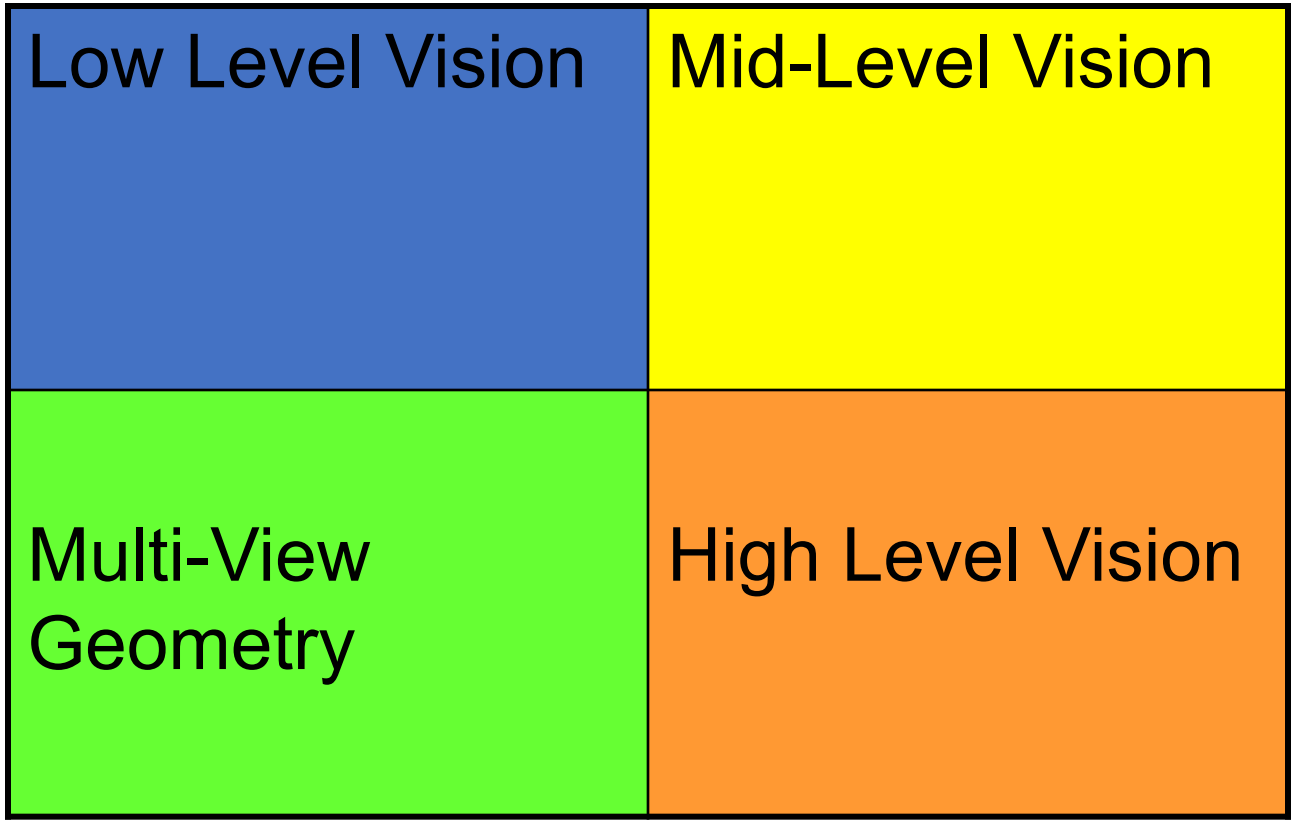


(i) Please outline your algorithm briefly.

(ii) Briefly explain how the circle is extracted by your algorithm, and how the line is ignored by your algorithm.

Review

Four modules



Middle Level Vision- Image segmentation, PCA, Faces

- Image segmentation: Kmeans (Lec07)
- Understanding PCA and Eigen faces for face representation and reconstruction
- Understanding face detection algorithm and, SVM, and Viola-Jones face detection algorithm

Multiple view geometry

- Understand Pinhole camera model, projection matrix, meaning of K, R, t
- Understand relative rotation and translation between two coordinate system.
- Understand Vanishing points, vanishing lines, measuring height from a single image
- Understand Two-view Epipolar geometry
  - Definition of Epipole, epipolar line, essential matrix and fundamental matrix
- SFM pipeline and its application
- Multi-view stereo

Multiple view geometry

- What is stereo vision? Disparity?
  - Basic geometry transformation between disparity and depth
  - Understanding how to find pixel correspondences in stereo vision
- Optical flow Vs Motion field. Definition and difference.
- Understanding how to compute optical flow

- Understanding shape from shading. Image formation for Lambertian surface
- Understanding what we could achieve by applying shape from shading algorithm
- Understanding photometric stereo pipeline

Deep Learning

- Understanding MLP network, activation functions, feedforward propagation and back propagation. How to perform back propagation in the neural network.
- Understanding the advantage of using convolutional neural network, examples about popular backbone network? Pooling, non-linearity,
- Understanding the differences among, image recognition, object detection, semantic segmentation, instance segmentation tasks

- Q & A??