Artificial Intelligence (B)

Prof. Jianguo Zhang

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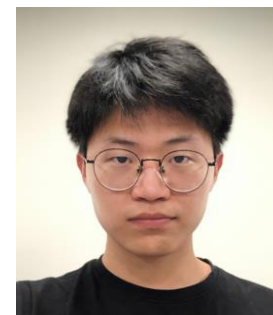
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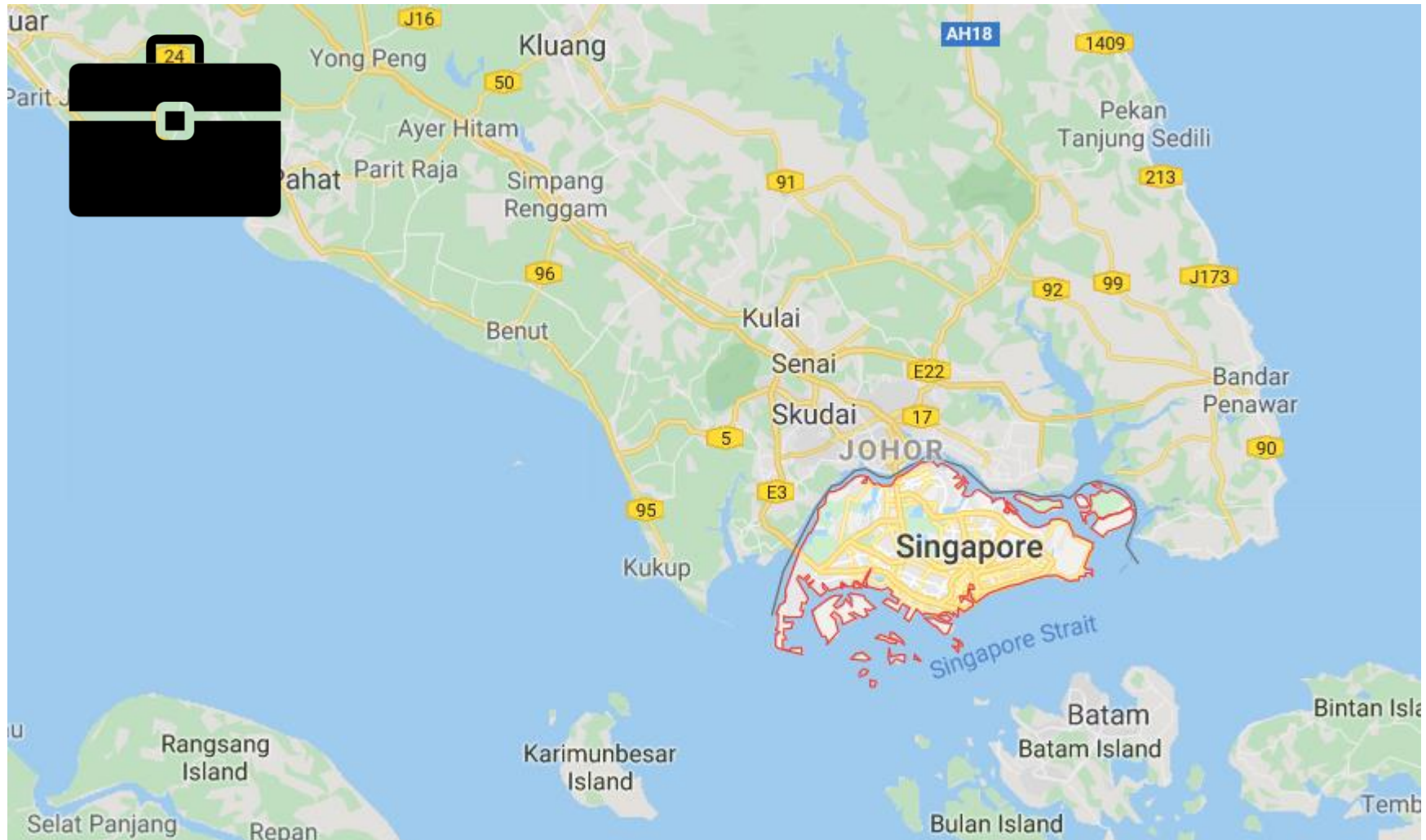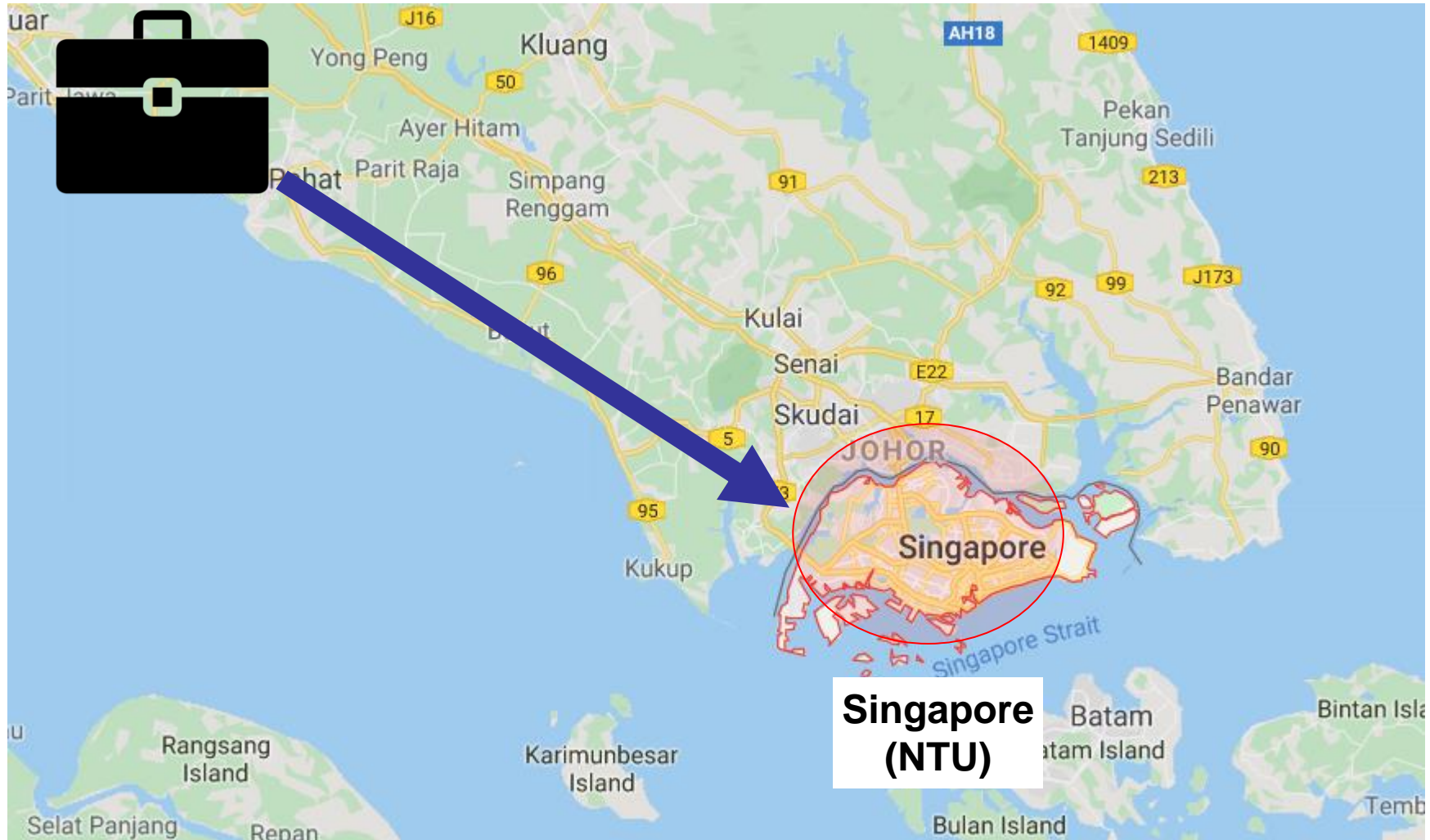12232380@mail.sustech.edu.cn

Who am I?

Who am I?

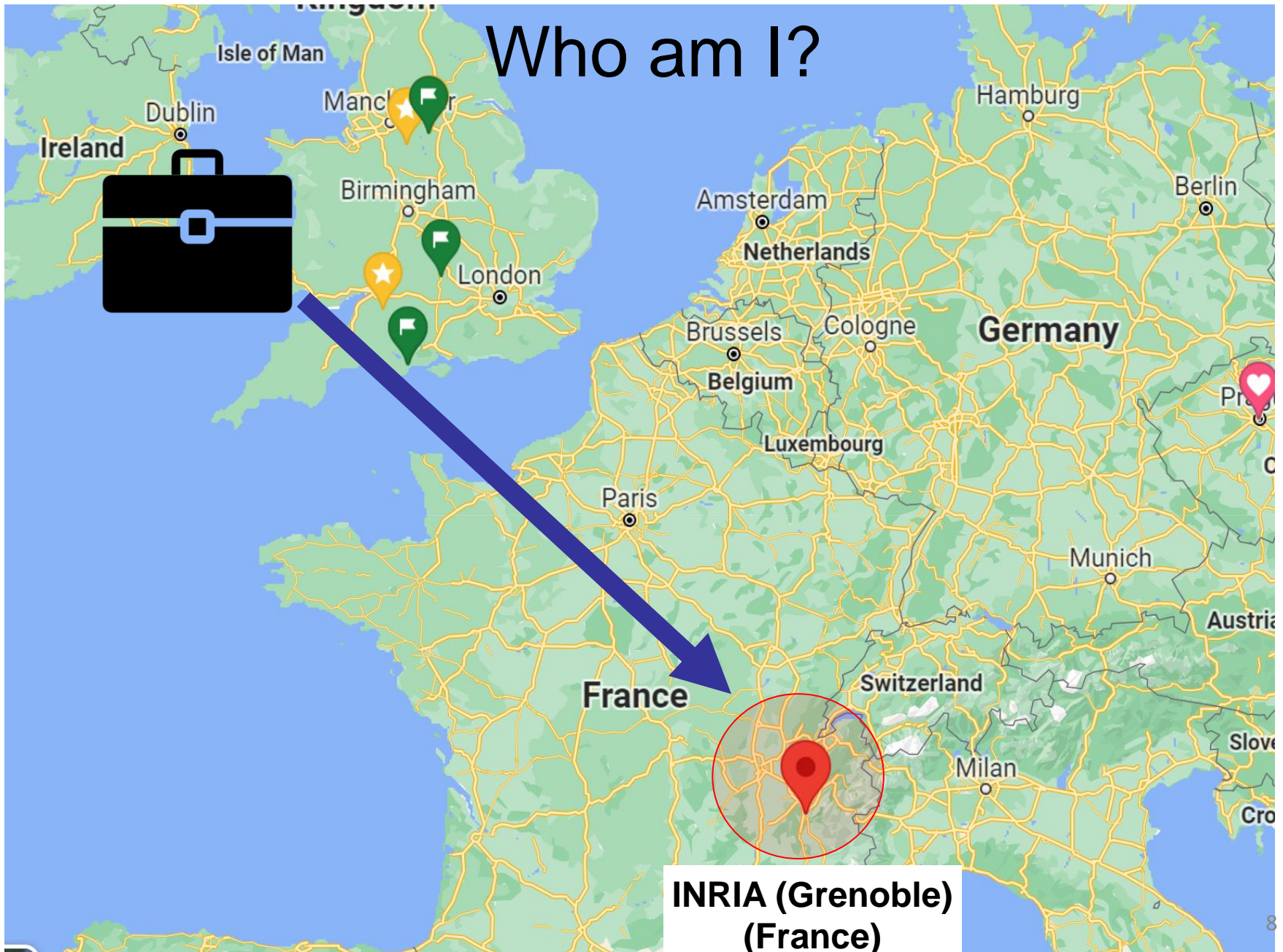
PhD, 2002

Who am I?

Who am I?

Singapore (NTU)

Who am I?

Who am I?

INRIA (Grenoble)
(France)

Who am I?

Who am I?

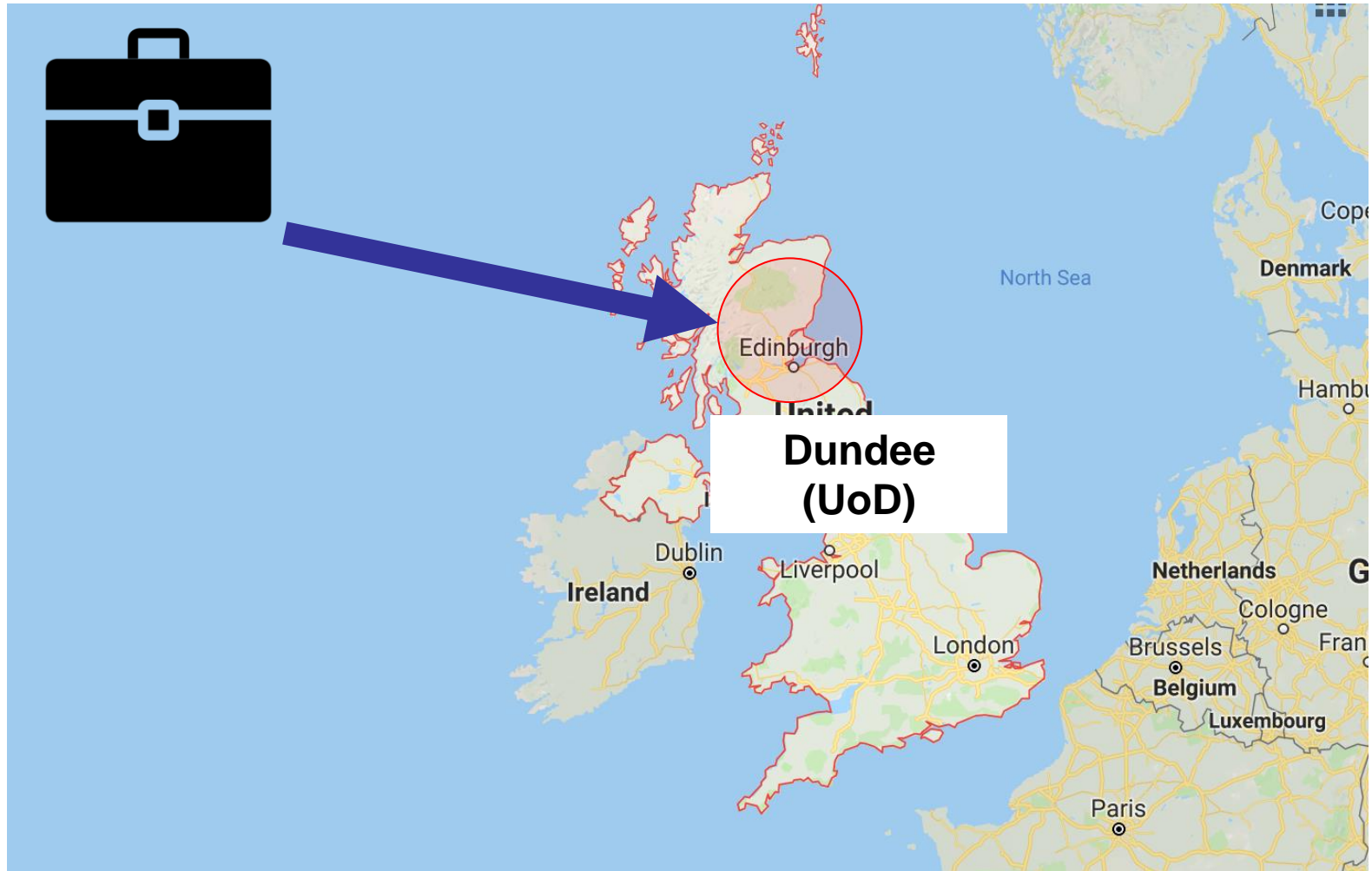London (QMUL)

Who am I?

Belfast
(QUB)

Who am I?

Dundee
(UoD)

Who am I?

Who am I?
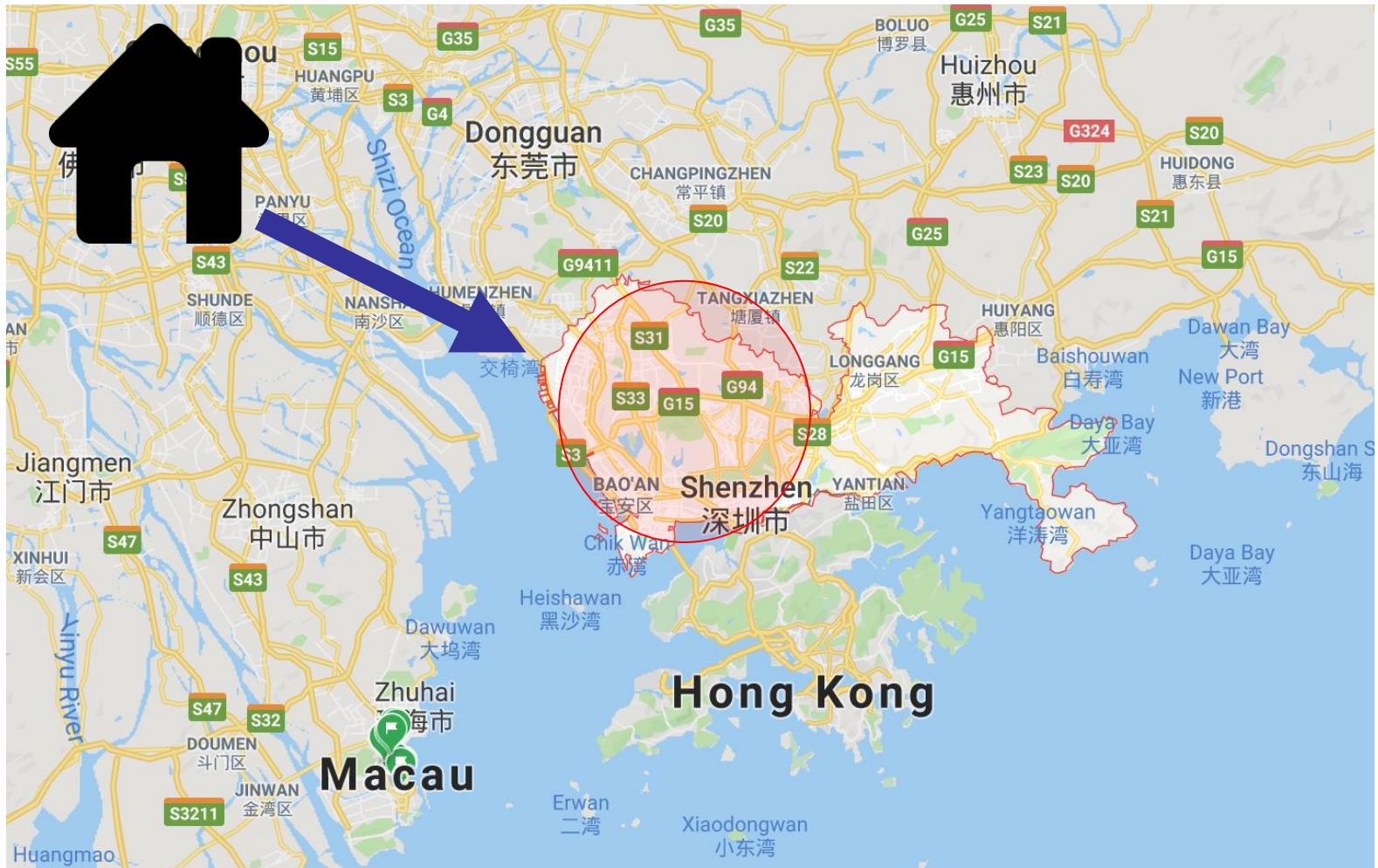
A bit introduction about myself

Jianguo Zhang

Department of Science and Engineering
SUSTech

Just in 2019:
Computing,
School of Science and Engineering
University of Dundee

the best known in Scotland

My working experience

2002, PhD - CAS

2002-03, NTU, Singapore

2003-05: Lear group, France

2005-2007 - Queen Mary, University of London, UK

2007- 2010 – Queen's University, Belfast

2010 – 2019 – University of Dundee

2019 – present, SUSTech, China

Research directions: Medical image processing (retina, OPT, tracking 3D objects, etc) and surveillance, Biometrics, action recognition etc

- ❑ **Brain Tumour Segmentation (MR/Microscopy)**
- ❑ **OPT Colorectal Polyp Analysis**
- ❑ **Endoscopic Polyps in Colons**
- ❑ **Human Action/Activity Recognition (RGB-D)**
- ❑ **Robust Person Re-identification**

My Current Research directions/areas: Medical image processing (Brain MRI) and surveillance (Person ReID and action recognition)

Research focus:
1) Uncertainty (BNN) and interpretability for medical image analysis
2) Life-long learning to overcome catastrophic forgetting
3) Unpaired multi-model segmentation
4) Safety of AI: attack and defense.

My Publications

Journals:
IJCV
IEEE T PAMI
MIA
IEEE T MI
IEEE T IP
Scientific report
nature

Conferences:
ICCV
CVPR
ECCV
BMVC
MICCAI
AAAI

If you are interested in doing a PhD through overseas programs, please come to see me.

My current collaborations with:
1. University of Warwick (62th in the world)
2. University of Surrey (very good collaborator)
3. University of Technology Sydney (top 200 universities)
4. Universities in HK: CityU, PolyU or UHK or HK university of Science and Technology.

Communications and Feedback

1. Via Email, zhangjg@sustech.edu.cn
2. Pop into my office Southern Block, School of Engineering: RM313, based on appointment.
3. Time: In class
4. We will also try to build a Wechat or QQ group.

We might assume basics of algebra, calculus, geometry, probability & stats.

There are some excellent on-line resources if your knowledge needs refreshing, e.g.
Gil Strang's Linear Algebra course at
http://ocw.mit.edu/courses/mathematics/18-06sc-linear-algebra-fall-2011/

We will <u>not</u> assume any previous experience of computer vision, image processing, machine learning or pattern recognition.

Aims

The aim of this course is to provide you with an understanding of two important and very active research areas of AI: Computer Vision techniques and Machine Learning techniques, as well as their application, and to give you experience in implementing some of these techniques.

You will have the opportunity to learn Matlab (python self-learning).

You will have the opportunity to present your work.

Tentative Module Contents

Computer Vision

W1 – Introduction to point operators and thresholding

W2 – Color and Sampling

W3 – FFT

W4 – Filtering, Scale, and edges

W5 – Optical Flow

W6 – Object detection and Recognition

W7 – Object Tracking

W8 – Problem Sets

W9 – Student presentations (for the first assignment)

Tentative Module Contents

Machine Learning

W10 – Performance evaluations

W11 – Deep Net and Support Vector Machines

W12 – Support Vector Machines

W13 – Clustering Methods

W14 – Dimensionality reduction for data analysis

W15 – Classification

W16 – Student presentations (for the second assignment)

Refs and Books

Computer Vision: A Modern Approach
David Forsyth and Jean Ponce

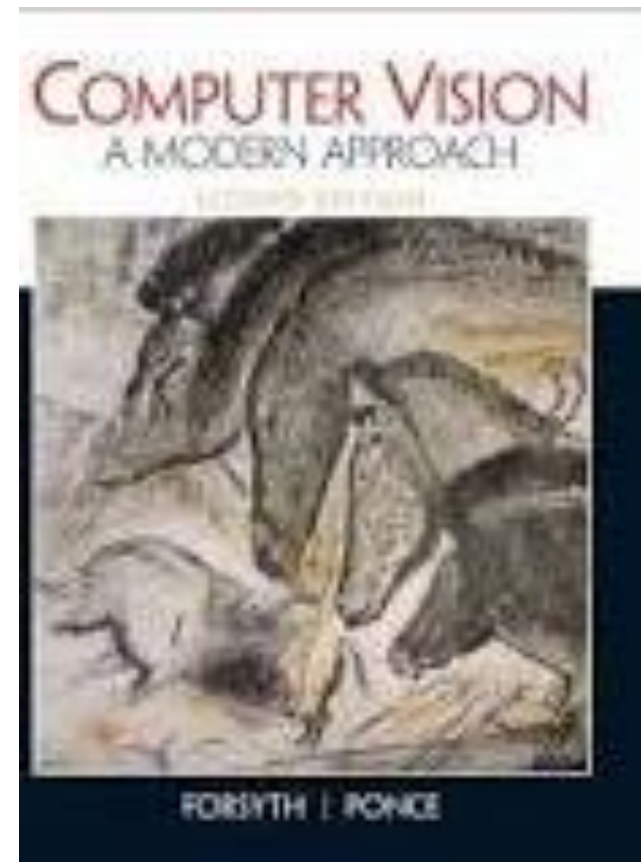**Computer Vision: Algorithms and Applications**
Richard Szeliski, Springer 2010
http://szeliski.org/Book/
(PDF free to download for personal use)

Computer Vision: Models, Learning, and Inference
Simon Prince, Cambridge University Press 2012
http://computervisionmodels.com/
(PDF free to download for personal use)

Refs and Books

Chris Bishop, **Pattern Recognition and Machine Learning**, Springer 2006 http://research.microsoft.com/en-us/um/people/cmbishop/prml

Kevin Murphy, **Machine Learning: A Probabilistic Perspective**, MIT Press 2012
http://www.cs.ubc.ca/~murphyk/MLbook/

Other materials include reading papers and tutorials (e.g., SVM tutorial) that I will distribute in the lecture and via blackboard.

Assessment

Course work and in-class assessment 80%

    Assignment 1 (Group –Image Mosaic– w9): --- 30%

    Assignment 1 – Presentation -- 5% (w9)

    (will be released in w2)

    Assignment 2 (Individual –classification and dim reduction w16) --- 30%

    Assignment 2 – Presentation (w16) -- 5%

    (will be released in w10)

    Attendance: **10%** (including both lectures and labs inspection)

Written Paper Exams 20%

    (scale if necessary)

Assessment – Summary (tentative)

	Report +Code	Presentation	Durations
Assignment -1	30%	5%	1-8 weeks Due in w9
Assignment -2	30%	5%	9-16 weeks Due in w16
Paper Exam	20%		Week 17
Attendance+Lab Exercise	10%		1-16weeks

Introductions

1. Introduce who you are
2. Where are you from
3. A bit history about yourself (e.g., your previous university, working experience etc…), i.e., your background.
4. You research interests, hobbies …
5. Why you choose this module? and what is your career plan?

Questions