

Edinburgh Imaging

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Common Image Processing Techniques 1

Semester 2 / January

20 Credits

Each Course is composed of Modules & Activities.

Modules:

Measure Lesion Size	IMSc	NI4R
Assess Volume Qualitative	IMSc	NI4R
Assess Volume Quantitative	IMSc	NI4R
White Matter Lesion Rating – Qualitative	IMSc	NI4R
White Matter Lesion Rating – Quantitative	IMSc	NI4R
Multi-centre studies and combining data sets	IMSc	NI4R

Each Module is composed of Lectures, Reading Lists, MCQ self-assessments, & Discussion Boards.

These Modules are taught on the following Programmes, or are incorporated into blended Courses which teach students enrolled outwith the Edinburgh Imaging Academy:

- NI4R - Neuroimaging for Research programme
- IMSc - Imaging programme

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Modules:

Measure Lesion Size:

Measurement

Assess Volume Qualitative:

Assessing whole brain volume

Assessing regional brain volumes

Assess Volume Quantitative:

Volumetric measurement principles

Whole brain volume, ventricular volume and intracranial area measurement

Temporal lobes and amygdalohippocampal volume measurement

White Matter Lesion Rating – Qualitative:

An introduction to white matter lesions

MR white matter lesion rating scales – Part A

MR white matter lesion rating scales – Part B

White Matter Lesion Rating – Quantitative:

Quantitative assessment – approaches and limitations

Individualising and semiautomating thresholding

Multi-centre studies and combining data sets:

Methods for combining large image datasets

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Measure Lesion Size

Lecture 1

Title: Measurement

Description: Principles and problems

Author(s): Dr. Andrew Farrall

Learning Objectives

- Outline how and why measurements are made from radiological images
- Describe the different sources of error which affect measurements

Assess Volume Qualitative

Lecture 1

Title: Assessing whole brain volume

Description: Methods for assessing whole brain volume

Author(s): Prof. Joanna Wardlaw, Dr. Karen Ferguson

Learning Objectives

- Recognise common patterns of brain volume loss with age
- Outline the principles of rating volume loss using scales
- Describe specific scales
- Rate scans using the scales

Lecture 2

Title: Assessing regional brain volumes

Description: Methods for assessing regional brain volumes

Author(s): Prof. Joanna Wardlaw, Dr. Karen Ferguson

Learning Objectives

- Recognise patterns of focal brain atrophy
- Outline methods of rating regional volume loss
- Describe several specific scales
- Apply these scales to rating scans
- Discuss differences between quantitative and qualitative scales and why this may be important in research and clinical practice

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Assess Volume Quantitative

Lecture 1

Title: Volumetric measurement principles

Description: General principles behind measuring brain volume

Author(s): Dr Karen Ferguson, Prof. Joanna Wardlaw

Learning Objectives

- Outline the general approach to measuring brain volumes quantitatively

Lecture 2

Title: Whole brain volume, ventricular volume and intracranial area measurement

Description: Steps involved in measuring whole brain volume

Author(s): Dr Karen Ferguson, Prof. Joanna Wardlaw

Learning Objectives

- Describe how to measure whole brain volumes, ventricular volumes quantitatively and intracranial area as a proxy for intracranial volume

Lecture 3

Title: Temporal lobes and amygdalohippocampal volume measurement

Description: Steps involved in measuring temporal lobes and amygdalohippocampal volume

Author(s): Dr Karen Ferguson, Prof. Joanna Wardlaw

Learning Objectives

- Describe how to measure temporal lobe and amygdalohippocampal volumes quantitatively

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White Matter Lesion Rating – Qualitative

Lecture 1

Title: An introduction to white matter lesions

Description: Types of white matter lesions and methods of quantifying them

Author(s): Joanna Wardlaw, Karen Ferguson, with assistance from Susie Shenkin

Learning Objectives

- Describe age-related white matter changes, including variation in type and appearance
- Outline what they are associated with and their causes
- Recognise the different types of white matter lesions on brain images
- Briefly outline rating scales used for white matter lesion rating

Lecture 2

Title: MR white matter lesion rating scales-Part A

Description: A description of commonly used MR scales for quantifying white matter lesions with examples

Author(s): Joanna Wardlaw and Karen Ferguson

Learning Objectives

- Describe different MR scales used for rating WML
- Rate WML using these scales
- Discuss the principles of subjective rating of any imaging feature
- Explain ceiling and floor effects

Lecture 3

Title: MR white matter lesion rating scales-Part B

Description: A description of commonly used MR scales for quantifying white matter lesions with examples

Author(s): Joanna Wardlaw and Karen Ferguson

Learning Objectives

- Describe different MR scales used for rating WML
- Describe scales that can be used with CT or MR
- Describe scales that can be used to rate change in white matter lesions over time
- Compare scales
- Rate WML using these scales

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White Matter Lesion Rating – Quantitative

Lecture 1

Title: Quantitative assessment- approaches and limitations

Description: Outlining quantitative approaches to white matter lesion rating

Author(s): Prof. Joanna Wardlaw

Learning Objectives

- Outline several approaches to measuring white matter lesion volume quantitatively
- Discuss problems with these approaches
- Analyze relative merits of quantitative vs qualitative approaches

Lecture 2

Title: Individualising and semi-automating thresholding

Description: Approaches being used locally to improve the volume measurement

Author(s): Prof. Joanna Wardlaw

Learning Objectives

- Outline several approaches to improve the quantitative volume measurement

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Multi-centre studies and combining data sets

Lecture 1

Title: Methods for combining large image datasets

Description: The need for methods to combine image data from multiple subjects and scanners, problems encountered and methods for overcoming these.

Author(s): Dr. Dominic Job

Learning Objectives

- Describe reasons for combining image datasets
- Describe the range of problems encountered
- Outline current and developing methods for overcoming these problems