

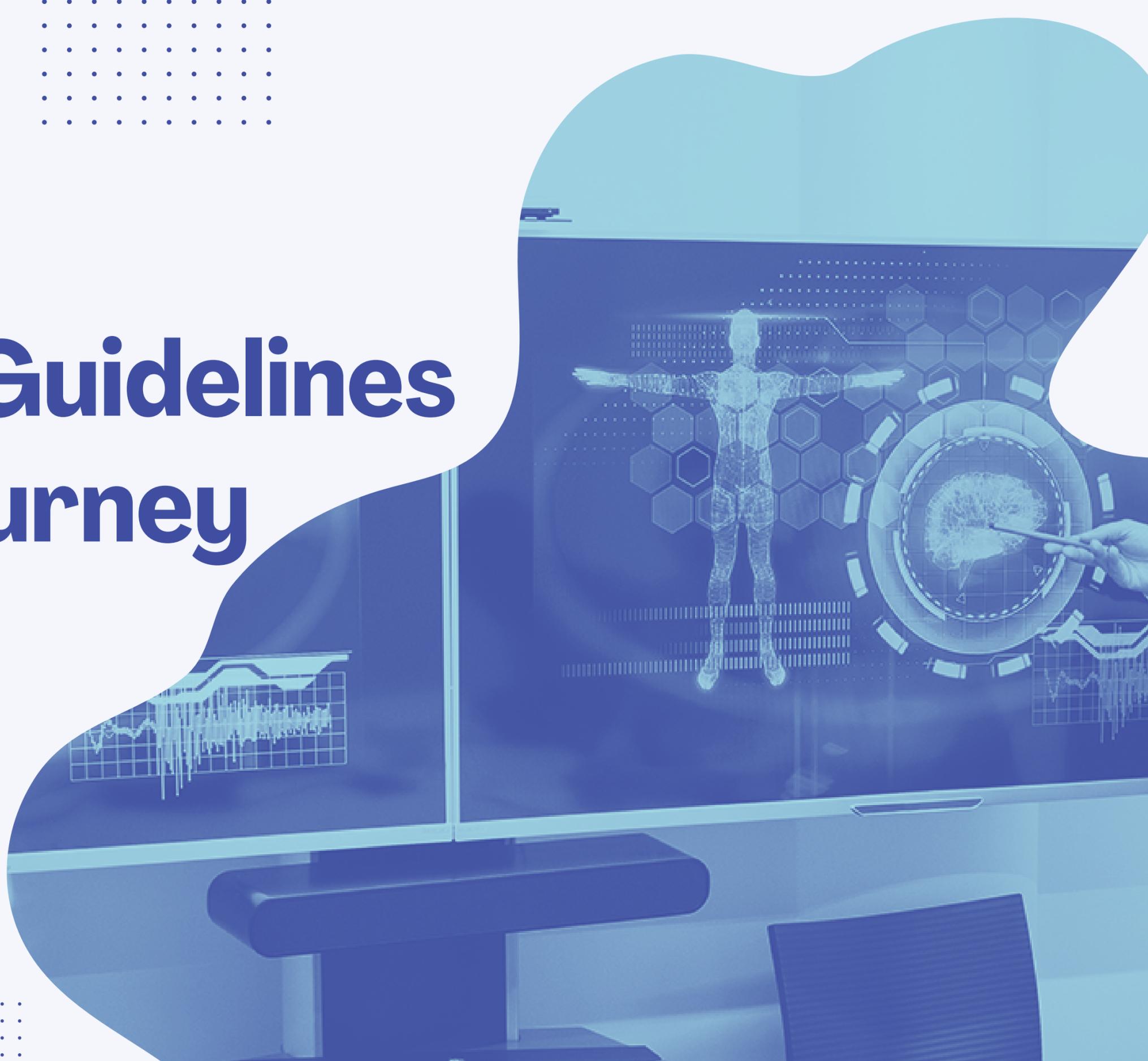


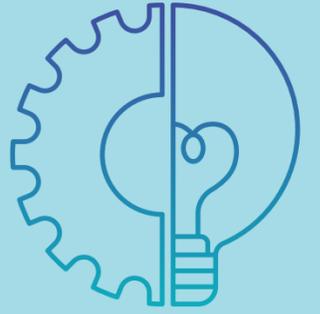
ARTIFICIAL INTELLIGENCE, INNOVATION & SOCIETY

Competence Guidelines & Learning Journey

**on Artificial
Intelligence Skills**

for Medical
Students



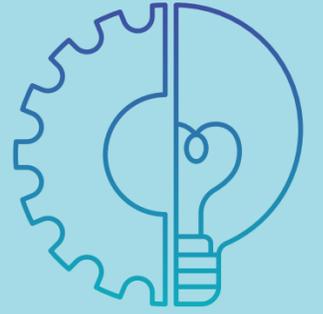


Artificial Intelligence Skills Modules Analysis





Artificial Intelligence Skills Modules



01

**Introduction to
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02

**Expert Systems in the
Healthcare Sector**

03

**Introduction to
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04

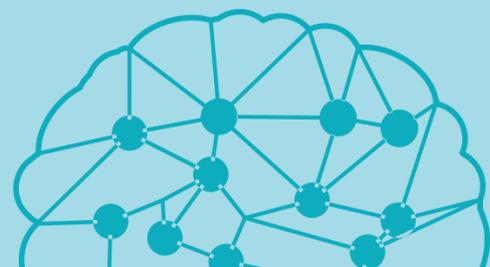
**Machine Learning in the
Healthcare Sector**

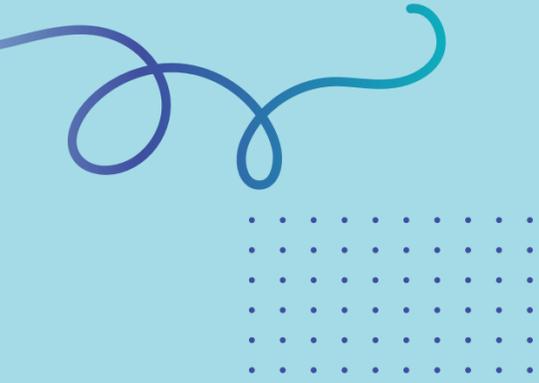
05

**Introduction to
Machine Vision**

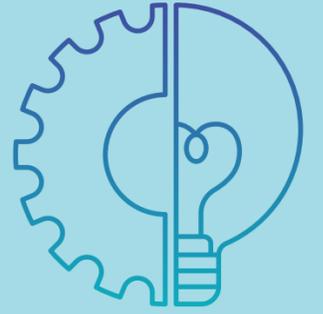
06

**Image Recognition in the
Healthcare Sector**





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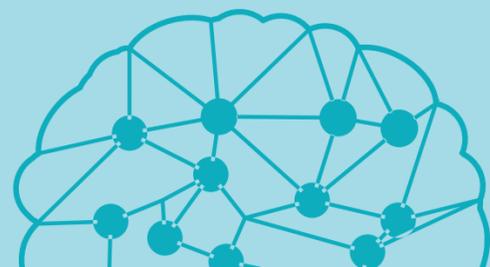
Machine Learning in the Healthcare Sector

05

Introduction to Machine Vision

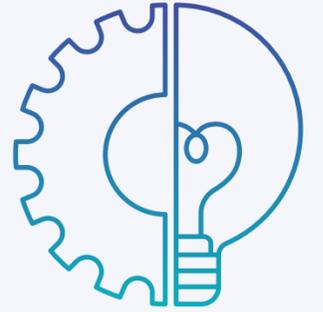
06

Image Recognition in the Healthcare Sector





Introduction to Artificial Intelligence



This course introduces the fundamentals of artificial intelligence. It will be an overview of the basic principles, techniques, and applications of Artificial Intelligence. The purpose of this module is to present students with a basic general understanding of the field of AI.



Key words

Artificial intelligence; Turing test; Machine learning; Problem solving; Knowledge representation; Machine vision



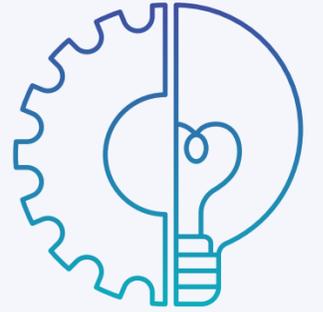
ECTS\Hours

2 Hours





Introduction to Artificial Intelligence



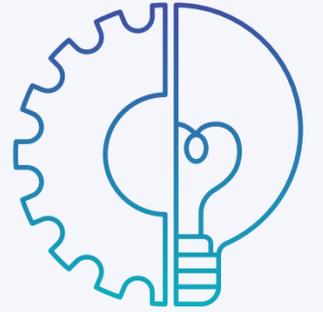
Learning outcomes:

- 1. Share knowledge about the historical development of the field
- 2. Explain basic concepts and assumptions underpinning key AI techniques
- 3. Describe the architecture behind common AI systems
- 4. Identify various AI techniques and match them to their respective application areas or use cases with emphasis on the medical sector





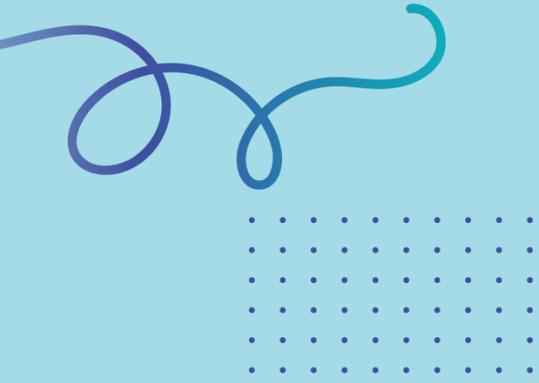
Introduction to Artificial Intelligence



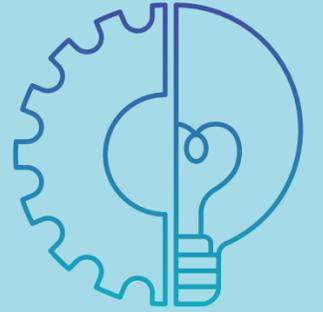
Content of the module:

The module deals with problems faced across multiple industries, with a strong focus on the medical sector, and how artificial intelligence has shaped the way industry addresses their respective challenges. The module contains 3 mini tasks with accompanying theory to provide students with a solid overview of AI in general and where it is applied in the medical sector.





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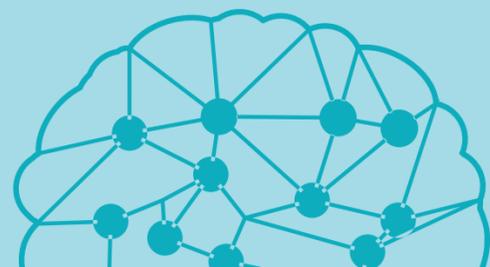
Machine Learning in the Healthcare Sector

05

Introduction to Machine Vision

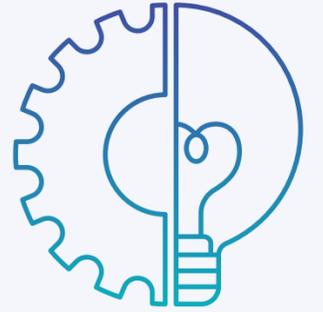
06

Image Recognition in the Healthcare Sector





Expert Systems in the Healthcare Sector



This module is an introduction to expert systems. The purpose of this course is to cover a broad range of topics relevant to computer assisted techniques for biomedical decision making and intends to give a broad overview of the complex area of decision support systems and their uses in medicine.



Key words

Expert systems; Knowledge-based systems, Rule-based representation, Inferencing; Heuristics; Interpreter; MYCIN; PUFF; CADUCEUS



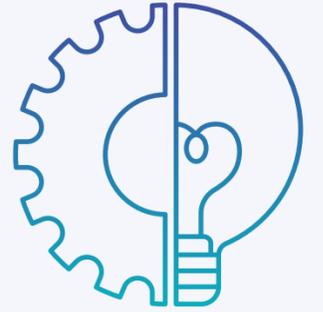
ECTS\Hours

6 Hours





Expert Systems in the Healthcare Sector



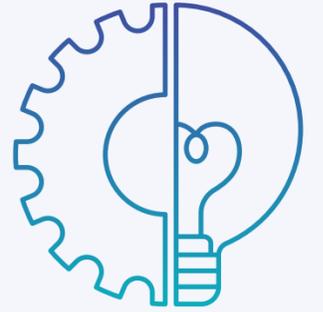
Learning outcomes:

-  1. Present an outline of the history of expert systems in the healthcare sector
-  2. Understand and explain the functioning of the different components of an expert system
-  3. Describe the most prominent expert systems currently in use in the healthcare sector
-  4. Rationalize potential application areas for expert systems in the healthcare sector





Expert Systems in the Healthcare Sector



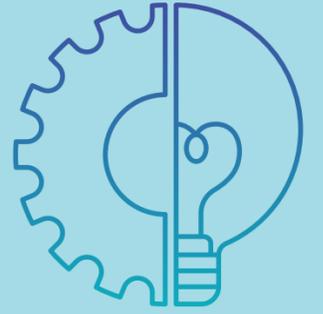
Content of the module:

The module deals with the nature of expert systems and how such knowledge-based systems have been integrated into the medical sector through time. The module contains theory in the form of informative videos and infographics with seven mini tasks that confirm the student's knowledge regarding the: (a) theoretical foundations; (b) basic components; and (c) application of expert systems in the medical sector.





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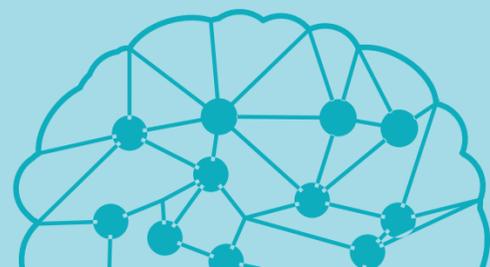
**Machine Learning in the
Healthcare Sector**

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**Introduction to
Machine Vision**

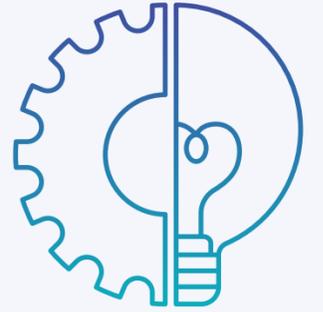
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**Image Recognition in the
Healthcare Sector**

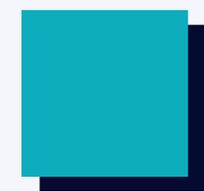




Introduction to Machine Learning



This module provides a practical introduction to machine learning. The module presents students with the key components of machine learning architecture and how various algorithms fit into the ML pipeline to produce results in the form of prediction models. The module will also demonstrate how to critically interpret the most common forms of ML output.



Key words

Machine learning; Data mining; Classification; Regression; Correlation; Statistical modelling; Decision trees;



ECTS\Hours

5 Hours





Introduction to Machine Learning



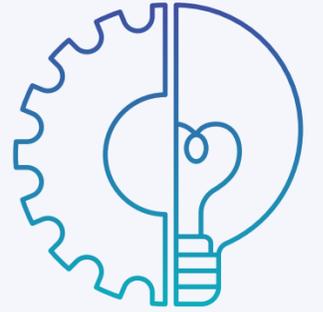
Learning outcomes:

1. Formulate a high-level view of machine learning architecture
2. Differentiate between a wide variety of learning algorithms
3. Identify the elements of a learned model and understand their impact on the model output
4. Assess the obtained accuracy of a machine learned model





Introduction to Machine Learning



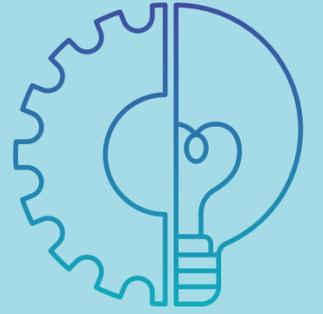
Content of the module:

The module sketches an overview of machine learning in the general sense through an explanation of the pipeline architecture that leads to various possible ML outputs. Students will receive theory content in the form of narrated ML model animations, informative videos and infographics. The module further comprises five mini tasks students must complete to confirm their general understanding of ML and its respective components.





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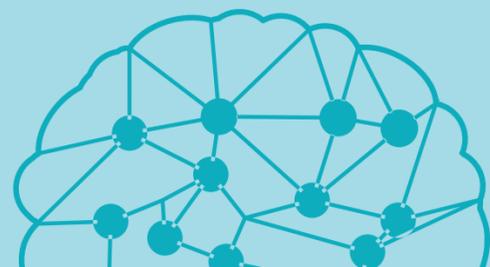
Machine Learning in the Healthcare Sector

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Image Recognition in the Healthcare Sector





Machine Learning in the Healthcare Sector



This module will introduce the fundamental concepts and principles of machine learning as it applies to medicine and healthcare. The module begins with an introduction to clinical data, and then explores the use of machine learning for risk stratification and diagnosis, disease progression modeling, improving clinical workflows, and precision medicine. The module will also present key ethical dilemmas that the application of ML in the medical sector brings forward.



Key words

Machine learning; Deep learning, Artificial neural networks; Text analysis, Data analysis, Classification; Linear classification; Regression; Diagnosis; Prediction; ethics;



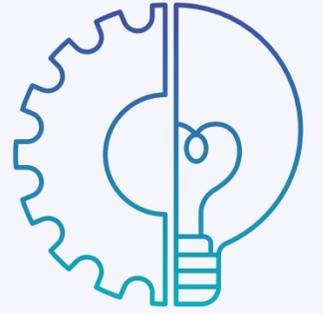
ECTS\Hours

5 Hours





Machine Learning in the Healthcare Sector



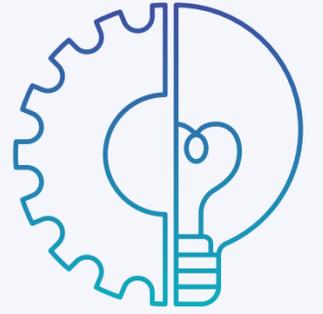
Learning outcomes:

- 1. Identify and explain the influence of machine learning on the healthcare sector
- 2. Describe how health information management can benefit from machine learning
- 3. Argue the benefits and drawbacks of applying machine learning to a healthcare-related problem space
- 4. Take an ethical stance for or against applying machine learning to a given healthcare problem area





Machine Learning in the Healthcare Sector



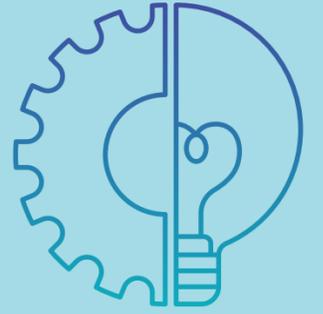
Content of the module:

The module provides students with various formats of theory content that covers ML from the perspective of: (a) data and decisions in Medicine. The module also introduces more complex topics such as deep learning and neural networks and how these are deployed in the medical sector. Specific attention is given to the role ML plays in diagnosis, predicting disease pathways and personalized treatment. Students will complete five mini tasks to confirm their learning.





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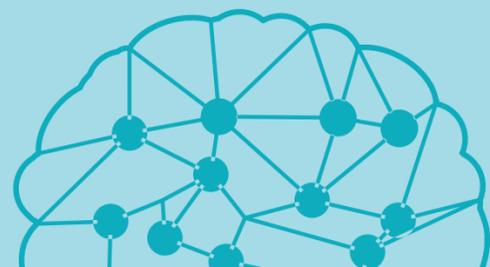
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Introduction to Machine Vision

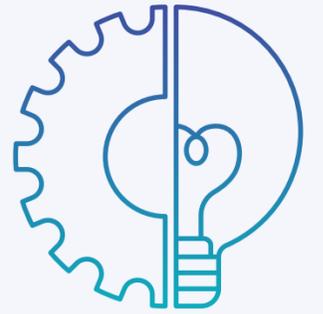
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Image Recognition in the Healthcare Sector

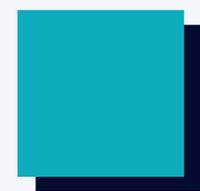




Introduction to Machine Vision



This module introduces computer vision as a field of artificial intelligence that deals with computational methods to help computers understand and interpret the content of digital images. The module presents various computer vision algorithms and explains each of their proficiencies at deriving meaningful information from both video and static images in the context of real-world problem solving.



Key words

Computer vision, Digital vision architecture, Digital visual input; Object detection; Scene reconstruction; Signal processing; Data transformation



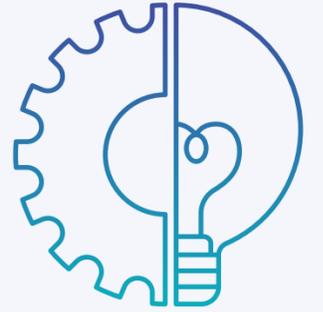
ECTS\Hours

4 Hours





Introduction to Machine Vision



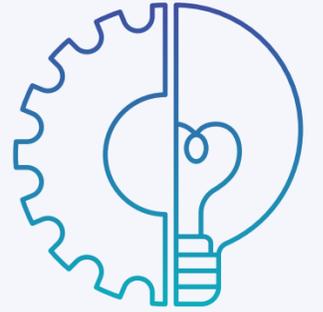
Learning outcomes:

- 1. Formulate a high-level view of computer vision architecture
- 2. Discuss the extraction and tracking capabilities of computer vision involving image and video data
- 3. Differentiate between a wide variety of computer vision algorithms
- 4. Express how existing computer vision algorithms can be applied to real-world problems involving image and video data.





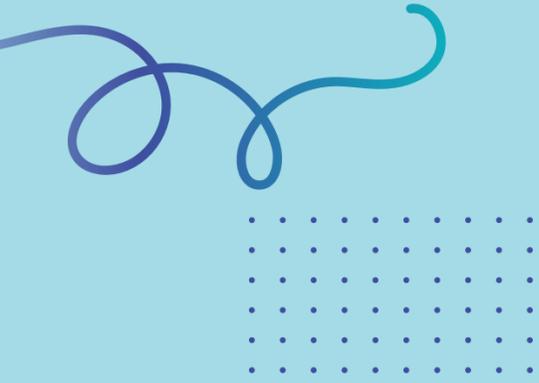
Introduction to Machine Vision



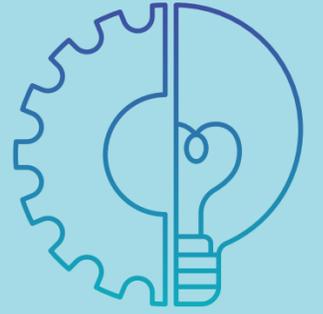
Content of the module:

The module contains various formats of theory content, including narrated animations, informative videos, infographics, and posters that explain the: (a) architecture; (b) common types of data transformation possibilities; and (c) most applicable real-world applications of a typical machine vision system. Students will have to complete five mini tasks to confirm their understanding of machine vision how it sets out to mimic and outperform human vision in given cases.





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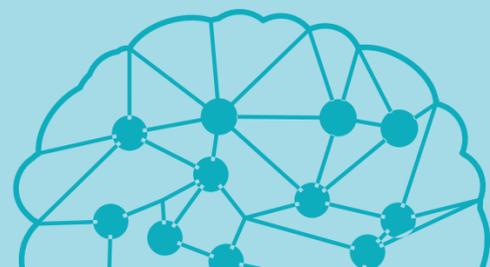
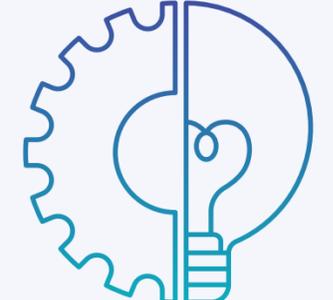




Image Recognition in the Healthcare Sector



This module covers various aspects of image recognition and how these have shaped current imaging techniques used in the healthcare sector, with a particular focus on image recognition diagnostics. The module also suggests possible benefits to patient care through facial recognition for patient admittance processes, emotion detection and health mirroring.



Key words

Image recognition, Facial recognition, Image classification, Image analysis, Image segmentation; Diagnostics; Medical imaging; Health mirror



ECTS\Hours

5 Hours





Image Recognition in the Healthcare Sector



Learning outcomes:

-  1. Report on both well-established and new medical imaging techniques and approaches
-  2. Identify and explain the influence of image recognition on the healthcare sector
-  3. Discuss how diagnostics can benefit from image recognition
-  4. Appraise the application of facial recognition to patient care





Image Recognition in the Healthcare Sector



Content of the module:

The module contains a series of short theory content artefacts that explain the past and current state-of-the-art image recognition techniques used within the healthcare sector and how these have influenced a variety of tasks within the sector. The module goes on to unpack how diagnostics and peripheral patient care activities have undergone major transformation by presenting several key technology use cases for image revisualization and facial recognition respectively. The student will complete five mini tasks to confirm their learning.





**Stay tuned
for more!**



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