



FACILITATE-AI

GUIDELINES FOR FACILITATING THE LEARNING OF ARTIFICIAL INTELLIGENCE
BY SCHOOL STUDENTS OF GRADES 7-12

Guidelines for facilitating the learning of Artificial Intelligence (AI) by School Students of Grades 7-12

Reference Number: 2021-1-CY01-KA220-SCH-000032567

C2 Training course: **Verification of training curriculum and developed learning materials**

Result 2 – A3

Module Number and Area/Topic: Module 3.3 – Image Classification

Module owners: IPP

Introduction and Broad Description of the Context and Goal of the area/topic addressed

Students will learn about the creation of image classification algorithms based on techniques from machine learning and deep learning. Focusing on a practical approach, foundational understanding of machine learning is detailed followed by practical examples during the initial introduction. Later students are presented with advanced concept from image classification in a project-based and inquiry-based learning supported by teachers that guide students. It is expected that students will be able to structure of an image-based dataset, the data collection process and how a Machine Learning model can be trained, evaluated, and used to automatically classify images into categories using neural networks autonomously and, in a competition-based activity.

Learning objectives and learning outcomes

- To know and apply the concepts of image classification
- Understand how to train models, evaluate model and model productionizing.
- To train machine learning models based on image datasets into a known category.
- Critically evaluate and compare multiple machine learning models according to objective criteria
- Understand the impact of data collection and model configuration on the quality of ML models

Competences

- Applying algorithms
- Processing data and digital content
- Communicating computational thinking
- Creatively using digital technology
- Managing data and digital content
- Creatively using & interacting with digital technology
- Adapting technology to create knowledge
- Proposing creative solutions to problems

Instruments/Tools/Supporting Material/Resources to be used:

- Knime.zip – a folder containing a knime installation with all plugins installed and configured for the lesson plan
- Workflows.zip – collection of knime workflows to demonstrate the application of neural networks, image preparation and classification.

- FACILITATE-AI-Knime-Presentation – supporting presentation with different modules for each task in the learning plan
- Kaggle.pdf – Instruction on how to host a Kaggle competition with the provided dataset to classify images as zombies or non-zombie.
- Dataset.csv – a dataset which contains different game characters which contains zombies and non-zombies samples that can be used as a starting point, to train a model
- Images.zip – a collection of images in different categories to be trained by the deep learning mode

PART 1 –	
Learning Objectives	<ul style="list-style-type: none"> • Define the context of machine learning problems • Learn and characterize a machine learning problems. • Learn the structure of deep learning models for image classification.
Learning Outcomes	<ul style="list-style-type: none"> • Machine learning definitions • Knime workflow execution and basic understanding of the machine learning pipeline from data to model training and evaluation • Understand the impact of data collection and model configuration on the quality of ML models • Processing data and digital content
Competences	<ul style="list-style-type: none"> • Communicating computational thinking • Processing data and digital content • Communicating computational thinking
Activities	<ul style="list-style-type: none"> • Presentations of machine learning context and categorization of machine learning problems and workflows

PART 2	
Learning Objectives	<ul style="list-style-type: none"> • Understanding basic machine learning workflows • Creation machine learning workflows for image classification.
Learning Outcomes	<ul style="list-style-type: none"> • Development of machine learning workflows for image classification. • Understand the impact of data collection and model configuration on the quality of ML models • know and apply the concepts of image classification
Competences	<ul style="list-style-type: none"> • Applying algorithms • Processing data and digital content • Communicating computational thinking • Creatively using digital technology • Managing data and digital content • Creatively using & interacting with digital technology • Adapting technology to create knowledge • Proposing creative solutions to problems
Activities	<ul style="list-style-type: none"> • Development of machine learning workflows using knime • Model optimization and evaluation • Model generalization to new image classification problems • Machine Learning Competition using Kaggle

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