[Programming] Section 05: [AI Tools an Analysis] Teacher Page

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Storyline

In this exciting lesson, students dive into the fascinating world of AI, uncovering core concepts such as machine learning, deep learning, and neural networks. They'll explore MATLAB's powerful AI toolboxes, including the Deep Learning Toolbox and Machine Learning Toolbox, to see how these tools bring AI algorithms to life with remarkable efficiency. Through dynamic demonstrations, students will learn to implement a variety of algorithms, from regression and classification to deep learning, and master the art of data analysis by seamlessly importing and exporting data into MATLAB.

Real-world examples will vividly illustrate AI's impact in fields like healthcare and finance, showing students the tangible benefits of AI in everyday life. The lesson also sparks thoughtful discussions on ethical considerations, ensuring students grasp the importance of fairness and privacy in AI development. Engaging projects and hands-on exercises provide an opportunity to apply their newfound knowledge, empowering students to use MATLAB's AI tools to tackle real-world challenges with confidence and integrity. This lesson promises to be an inspiring journey into the limitless possibilities of AI!

Main Learning Goal

Students will learn fundamental AI concepts, including machine learning, deep learning, and neural networks, and how to implement these using MATLAB's AI toolboxes. They will gain hands-on experience with various AI algorithms and data analysis techniques, while also exploring real-world applications and ethical considerations in AI development. By the end of the lesson, students will be proficient in using MATLAB to analyze data and develop AI models to solve real-world problems.

Focus Question

How can we leverage MATLAB's AI toolboxes to analyze data, develop AI models, and address real-world challenges, while ensuring ethical considerations are integrated into our solutions?

Elicit
How will I engage students and elicit their ideas?

Activity Name and Description	Teacher Moves	Student Moves	Resources
• **[AI in Daily Life Discussion]** • *10 minutes* • Engage students in a discussion about the relevance and applications of AI in everyday life, covering areas like recommendation systems, virtual assistants, social media algorithms, safety and security systems, and online shopping recommendations.	• Introduce the activity by explaining its purpose and relevance. • Show a short video on AI applications in daily life to spark interest and provide context. • Pose open-ended questions related to AI applications and ethical considerations. • Facilitate the discussion by encouraging students to share their ideas and experiences. • Summarize key points and connect them to the lesson objectives.	• Watch the video attentively. • Actively participate in the discussion by sharing their thoughts, experiences, and ideas about AI applications. • Respond to the teacher's questions and engage with their peers' contributions. • Reflect on the ethical considerations and implications of AI in daily life.	• Video Link

Develop
How will I get students to explore, explain, and develop ideas?

Activity Name and Description	Teacher Moves	Student Moves	Resources
• **[Exploring AI with MATLAB]** • *40-50 minutes*	• Provide an overview of the self-guided activity and	Introduction: • Open the MATLAB Live Script and review the introduction, which discusses	• Mathworks

Activity Name and Description	Teacher Moves	Student Moves	Resources
• Students will learn the relevance and applications of AI, the KNN (k-nearest neighbors) model, and GoogleNet (a convolutional neural network for image recognition) through a self-guided MATLAB Live Script. This script will provide instructions, explanations, and code samples, allowing students to work independently while exploring these concepts and implementing models.	its objectives. • Distribute the MATLAB Live Script that contains the structured lesson. • Ensure all students have MATLAB installed and can access the Live Script. • Circulate the room to answer questions and provide assistance as needed. • Encourage collaboration among students for peer learning and support. • Summarize the key points and address any questions at the end of the activity.	the relevance and applications of AI in everyday life, including recommendation systems, virtual assistants, social media algorithms, safety and security systems, and online shopping recommendations. Teaching KNN: • Read the explanation of the KNN model in the Live Script. • Follow the step-by-step instructions to create a KNN model predicting F1 race drivers' final positions based on starting positions. • Complete exercises on data preprocessing, model training, and evaluation within the Live Script. • Take notes on key concepts and ask the teacher for clarification if needed.	

Activity Name and Description	Teacher Moves	Student Moves	Resources
		Introducing GoogleNet: • Review the explanation of neural networks and convolutions in the Live Script. • Study the architecture and workings of GoogleNet, understanding its application in image recognition tasks. • GoogleNet Image Recognition Code: • Follow the detailed breakdown of a sample GoogleNet image recognition code within the Live Script. • Work through each component, including data preprocessing, model architecture, training, and inference. • Experiment with the provided code, making small modifications to observe effects on model performance.	

Activity Name and Description	Teacher Moves	Student Moves	Resources

Deploy
How will I get students to use and apply their ideas to what they've learned?

Activity Name and Description	Teacher Moves	Student Moves	Resources
• **[KNN Problem Solving]** • *20 - 30minutes* • Students will tackle a real-world problem involving the KNN algorithm. They will be provided with datasets containing metrics related to songs by artists like Kendrick Lamar and Sabrina Carpenter, such as song duration and popularity. The challenge is to develop a KNN	• Present the real-world problem involving KNN. • Provide the datasets and explain the metrics. • Guide students through the process of data exploration, feature selection, model training, and evaluation. • Offer support and answer questions as students work on the problem. • Encourage students to apply their understanding of KNN and MATLAB programming skills effectively.	• Review the provided datasets and understand the metrics related to songs by Kendrick Lamar and Sabrina Carpenter. • Engage in data exploration to understand the patterns and relationships in the data. • Select relevant features for the KNN model. • Train a KNN model using MATLAB, following the steps of data preprocessing, model training, and evaluation. • Test and refine their model to improve accuracy. • Collaborate with peers, share insights, and seek	• Mathworks

Activity Name and Description	Teacher Moves	Student Moves	Resources
model that predicts the artist of a song based on these metrics.		• assistance if needed. • Document their process and findings, preparing to present their results and discuss challenges faced during the activity.	

Refine

How will I get students to extend, elaborate, and change their ideas based on what we now understand?

Activity Name and Description	Teacher Moves	Student Moves	Resources
• **[Activity Name: Ethical and Technological Implications of AI]** • *15 minutes* • Students will watch at least two of three provided videos on AI and then participate in a guided discussion, exploring ethical, technological, and social implications of KNN and CNN models.	• Assign students to watch a minimum of two out of three provided video links before the discussion. • Present the discussion questions, categorized under ethical considerations, technological impacts, social implications, and future perspectives. • Facilitate the discussion, ensuring all students have the opportunity to contribute.	• Watch at least two of the assigned videos attentively, taking notes on key points. • Participate actively in the discussion, sharing their thoughts, insights, and reflections on the video content. • Respond to the teacher's questions and engage with peers' comments to build on each other's ideas.	• Video Link 1 • Video Link 2 • Video Link 3

Activity Name and Description	Teacher Moves	Student Moves	Resources
	• Encourage deeper thinking by asking follow-up questions and connecting student responses to real-world examples and lesson objectives.	• Reflect on the ethical considerations of using KNN and CNN models in various applications. • Discuss the technological advancements brought by these models, including their benefits and potential drawbacks. • Explore social implications, such as the creation of filter bubbles or exacerbation of inequalities. • Consider future perspectives, envisioning how AI technologies might evolve and impact society.	