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# CAPSTONE PROJECT

## COURSE CONTENT SIMPLIFICATION AGENT

**Presented By:**

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# OUTLINE

- Problem Statement
- Proposed System/Solution
- System Development Approach
- Algorithm & Deployment
- Result (Output Image)
- Conclusion
- Future Scope
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# PROBLEM STATEMENT

- Educational materials often present content in a way that is too complex or jargon-heavy for learners with varying levels of prior knowledge. This creates barriers to understanding, leading to frustration and reduced learning effectiveness. There is a need for an AI-powered solution that can analyze academic content and dynamically simplify or elaborate explanations tailored to the learner's proficiency level—from beginner to expert—thereby enabling personalized, inclusive, and scalable learning experiences.

# PROPOSED SOLUTION

Develop an AI-powered Course Content Simplification Agent that intelligently analyzes academic texts and automatically adjusts the complexity of explanations based on the learner's proficiency level. The system will:

- **Assess Learner Proficiency:** Use initial diagnostics or user input to determine the learner's current knowledge level (beginner, intermediate, expert).
- **Content Analysis:** Employ natural language processing (NLP) techniques to identify jargon, complex sentence structures, and dense concepts in faculty notes and textbooks.
- **Adaptive Simplification:** Reframe and rewrite content using simplified language, analogies, and step-by-step explanations for beginners, while providing more detailed, technical, and concise versions for advanced learners.
- **Interactive Feedback:** Allow learners to request further simplification or elaboration, fostering an adaptive dialogue that tailors content dynamically.
- **Multi-Format Support:** Deliver simplified content in various formats such as summaries, bullet points, or visuals to enhance comprehension.

This approach will support personalized learning paths, improve accessibility, and help learners engage with academic content effectively regardless of their starting proficiency.

# SYSTEM APPROACH

## 1 . System Requirements

- **User Input:** Learner profile data (proficiency level, subject area, preferences) and academic content (textbooks, notes, articles).
- **Processing Power:** Cloud-based or local servers capable of running NLP and large language models efficiently.
- **Scalability:** Ability to serve multiple users simultaneously with personalized simplifications.
- **User Interface:** Web or mobile interface for learners to input content, view simplified explanations, and provide feedback.
- **Data Storage:** Secure database to store learner profiles, interaction history, and content versions.

## 2. Libraries and Tools Required

- **Natural Language Processing:**
  - Hugging Face Transformers (for pretrained language models)
  - SpaCy or NLTK (for text preprocessing and linguistic analysis)
- **Machine Learning Frameworks:**
  - PyTorch or TensorFlow (for fine-tuning and model deployment)
- **Cloud Services (optional):**
  - IBM Cloud

### 3. Model Building and Deployment Workflow

- Data collection and preprocessing of academic materials.
- Fine-tuning language models for simplification and paraphrasing tasks.
- Integrating proficiency assessment to tailor outputs.
- Developing API endpoints for content processing and feedback handling.
- Building a responsive user interface to deliver and refine content.

# ALGORITHM & DEPLOYMENT

- In the Algorithm section, describe the machine learning algorithm chosen for predicting bike counts. Here's an example structure for this section:
- **Algorithm Selection:**

A fine-tuned **Transformer-based model** (e.g., Granite-2B-Instruct) is used for text simplification due to its ability to understand complex academic language and generate tailored outputs for different learner levels.
- **Data Input:**

The model takes academic text and the learner's proficiency level as inputs.
- **Training Process:**






The model is trained or fine-tuned on pairs of complex and simplified academic content, using techniques like transfer learning and basic hyperparameter tuning.
- **Prediction Process:**

The trained model generates simplified explanations based on input complexity and learner level, adjusting in real time as needed.



# RESULT

Projects / content simplifier / content simplifier Agent

Share feedback  Autosave on  New agent + Deploy   

## Build

AI Model: llama-3-3-70b-instruct

Setup

Configuration

Framework: LangGraph Architecture: ReAct

Instructions [Advanced configuration](#)

You are a helpful assistant that uses tools to answer questions in detail.  
When greeted, say "Hi, I am watsonx.ai agent. How can I help you?"

You are a content simplification agent that rewrites academic or technical content to match a learner's proficiency level. Based on the user's input, simplify the content while keeping core...

Knowledge

Tools


[Add a tool](#) [Create custom tool](#)

Added tools (1)

## Agent preview

content simplifier Agent 06:06 PM

Welcome to content simplifier Agent  
Change this description to reflect your particular agent



Type something...



You: 06:14 PM

{ "content": "Photosynthesis is the process by which green plants use sunlight to make food from carbon dioxide and water.", "level": "beginner" }



watsonx Agent 06:14 PM

Photosynthesis is how plants make food. They use energy from sunlight, water, and a gas called carbon dioxide. This process helps plants grow and gives them the energy they need to survive.

► How did I get this answer?



You: 06:15 PM

{ "content": "Artificial intelligence is a branch of computer science focused on building smart machines capable of performing tasks that typically require human intelligence, such as learning and problem-solving.", "level": "advanced" }



content simplifier Agent 06:15 PM

Artificial intelligence (AI) is a subfield of computer science that endeavors to create machines that possess the ability to execute tasks that would normally necessitate human intelligence, such as learning, problem-solving, decision-making, and perception. This multidisciplinary field draws on knowledge from computer science, mathematics, engineering, and cognitive science to develop algorithms, statistical models, and computer programs that enable machines to perform intelligent tasks, often by utilizing complex data structures, machine learning techniques, and optimization methods. The ultimate goal of AI research is to create machines that can autonomously adapt, learn, and improve their performance over time, thereby augmenting human capabilities and transforming numerous aspects of modern life.

► How did I get this answer?



You: 06:14 PM

{ "content": "The theory of evolution, proposed by Charles Darwin, explains how species change over time through a process called natural selection.", "level": "intermediate" }



content simplifier Agent 06:14 PM

The theory of evolution, developed by Charles Darwin, describes how living organisms have changed and adapted over millions of years. This process, known as natural selection, occurs when individuals with certain traits are better suited to their environment and therefore more likely to survive and reproduce, passing those traits on to their offspring. As a result, species evolve and diversify, leading to the wide range of plant and animal life we see today.

► How did I get this answer?

The screenshot displays the IBM Watsonx Agent Lab interface. The top navigation bar includes the IBM Watsonx logo, an 'Upgrade' button, a user profile icon, and a dropdown menu for 'Browse Watson's Accounts'. The main header shows the current project path: 'Projects / content-simplifier / Agent Lab'. Below this, there are tabs for 'Build' and 'Agent preview'. The 'Build' tab is active, showing a configuration panel with sections for 'Setup', 'Configuration', 'Instructions', 'Knowledge', and 'Tools'. The 'Configuration' section has dropdowns for 'Framework' (LangGraph) and 'Architecture' (ReAct). The 'Instructions' section contains a text area with the following content: 'You are a helpful assistant that uses tools to answer questions in detail. When greeted, say "Hi, I am watsonx.ai agent. How can I help you?". You are a content simplification agent that rewrites academic or technical content to match a specified proficiency level. Based on the user's level, select the content and rewrite it.' The 'Tools' section has buttons for 'Add a tool' and 'Create custom tool'. The 'Agent preview' tab on the right shows a chat history with the same three messages as the previous blocks, including the JSON inputs and the simplified outputs from the 'content simplifier Agent'.

## Course Content Simplifier Agent

Deployed Online

API reference

Test

Preview

New chat +

Hi, I am watsonx.ai agent. How can I help you?

B

You 06:32 PM

{ "content": "Neurons communicate with each other using electrical impulses and chemical signals across synapses.", "level": "beginner" }

Course Content Simplifier Agent 06:32 PM

Neurons are like messengers in our brain. They talk to each other in two ways: through electricity and special helpers called chemicals. These chemicals jump from one neuron to another at tiny gaps called synapses. This helps our brain work and remember things.

► How did I get this answer?



Type something...

### Description

An AI agent that rewrites educational content based on learner level—beginner, intermediate, or adva

### Deployment Details

Deployment ID: 1692b884-fae5-48...

Serving name:

No serving name.

Software specification:  
[runtime-24.1-py3.11](#)

Hardware specification:  
Extra extra small: 1 CPU and 2 GB RAM

Copies:  
1

### Tags

wx-agent

### Associated asset

[Course Content Simplifier Agent](#)

f26119b6-68af-4464-8d62-257c28988db0

Last modified  
3 minutes ago

Created on  
Jul 31, 2025

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# CONCLUSION

- Summarize the findings and discuss the effectiveness of the proposed solution. Highlight any challenges encountered during the implementation and potential improvements. Emphasize the importance of accurate bike count predictions for ensuring a stable supply of rental bikes in urban areas.

# FUTURE SCOPE

- Discuss potential enhancements and expansions for the system. This could include incorporating additional data sources, optimizing the algorithm for better performance, and expanding the system to cover multiple cities or regions. Consider the integration of emerging technologies such as edge computing or advanced machine learning techniques.

# REFERENCES

- IBM watsonx.ai Documentation – [ibm.com/docs/en/watsonx](https://ibm.com/docs/en/watsonx)
- IBM Granite Models – [research.ibm.com](https://research.ibm.com)
- Mayer, R. (2009). *Multimedia Learning*, Cambridge University Press.
- Siddharthan, A. (2014). *Text Simplification in NLP: A Survey*, Synthesis Lectures.

# IBM CERTIFICATIONS



# IBM CERTIFICATIONS





# IBM CERTIFICATIONS

**IBM SkillsBuild**

Completion Certificate



This certificate is presented to  
**Bhavanishree Srinivasan**

for the completion of  
**Lab: Retrieval Augmented Generation with  
LangChain**  
(ALM-COURSE\_3824998)

According to the Adobe Learning Manager system of record

**Completion date:** 24 Jul 2025 (GMT)

**Learning hours:** 20 mins



**THANK YOU**