

BAB II

PELAKSANAAN UJIAN KOMPETENSI

Pada proses mendapatkan sertifikat AI Developer ini , student diwajibkan untuk menyelesaikan kurang lebih 10 module (courses).

Didalam Module-module, kita diberikan akses ke video training, document untuk dibaca dan dipelajari, quiz-quiz untuk diselesaikan, tugas-tugas untuk diselesaikan, dan ujian untuk diselesaikan.

Quiz dapat berupa pilihan point dan essay, tugas-tugas juga dapat berupa pilihan point, essay, dan Hands on Lab, ujian dapat berupa pilihan point, essay, dan Hands on Lab.

Hands on Lab yaitu suatu lab khusus yang dibuat oleh organisasi penyedia sertifikasi, dan dapat di akses oleh student. Pada sertifikasi IBM AI Developer, Hands on Lab yang diberikan yaitu berupa Integrated Development Environment yang diakses di browser secara online untuk menulis dan menjalankan code programming.

2.1 Materi yang dipelajari

Berikut modul-modul yang diselesaikan untuk memperoleh sertifikat IBM AI Developer:

A. Introduction to Software Engineering

Deskripsi materi yang dipelajari :

1. Belajar teori tentang bagaimana pekerjaan seorang Software Engineer.
2. Belajar tentang perbedaan software engineer dan software developer.
3. Belajar tentang Software Development Life Cycle (SDLC)
 - a. Plan (Requirements in SRS,URS,SysRS)
 - b. Design,
 - c. Development,
 - d. Testing (Unittesting, Integration Testing, System Testing, Acceptance Testing).
 - e. Deployment (Tested code -> user acceptance testing environment -> prod environment)
 - f. Maintenance (Other bugs, code enhancement, New and changing requirements, UI issues)
4. Belajar Software Development Methodologies
 - a. Waterfall
 - b. V-Shape
 - c. Agile
5. Software Versioning
6. Software Testing
7. Tools pada software development
8. Programming language dan organisasi
9. Programming logic dan concept
10. Software Architecture dan Design

11. Software Architecture pattern dan deployment
12. Software Engineer
13. Final Exam Quiz

B. Introduction to Artificial Intelligence (AI)

Deskripsi materi yang dipelajari :

1. Belajar tentang arti,makna,penerapan dan kawasan yang termasuk dalam Artificial Inteligence.
 - a. How AI Learn (Supervised,Unsupervised,Reinforcement)
 - b. Type AI (Weak,Strong,Super AI)
 - c. Traditional AI vs Generative AI
2. Impact dari AI
3. Apa itu generative AI
4. ML,DL,NN
 - a. Machine Learning, a subset of AI, uses computer algorithms to analyze data and make intelligent decisions based on what it has learned. The three main categories of machine learning algorithms include Supervised Learning, Unsupervised Learning, and Reinforcement learning.
 - b. Deep Learning, a specialized subset of Machine Learning, layers algorithms to create a neural network enabling AI systems to learn from unstructured data and continue learning on the job.
 - c. Neural Networks, a collection of computing units modeled on biological neurons, take incoming data and learn to make decisions over time. The different types of neural networks include Perceptrons, Convolutional Neural Networks or CNNs, and Recurrent Neural Networks or RNNs.

5. ML Technique:
 - a. Supervised Learning is when we have class labels in the data set and use these to build the classification model.
 - b. Supervised Learning is split into three categories – Regression, Classification, and Neural Networks.
 - c. Machine learning algorithms are trained using data sets split into training data, validation data, and test data.
6. Ai Applications
 - a. NLP, Speech, Computer Vision
7. LLM

LLM (Large Language Model) adalah model AI yang dilatih dengan banyak data teks untuk memahami dan menghasilkan bahasa manusia, seperti GPT.
8. Evolution and future of AI
9. Final Exam Quiz

C. Generative AI: Introduction and Applications

Deskripsi materi yang dipelajari :

1. Belajar tentang arti Generative AI dan non-generative AI, dan mempelajari contoh penerapan generative AI.
2. Contoh penerapan Gen AI
 - a. Art and entertainment: Generative AI is being used to create new art forms, such as AI-generated paintings, music, and literature. Generative AI is also being used to develop new video games and other interactive experiences.
 - b. Medicine: Generative AI is being used to develop new medical treatments, such as personalized cancer therapies and AI-powered drug discovery. Generative AI is also being used to develop new

medical imaging tools and improve diagnosis and treatment accuracy.

- c. Business: Generative AI is being used to improve the efficiency of businesses by automating tasks such as customer service, marketing, and sales. Generative AI is also being used to develop new products and services.

3. Practice : Generate Text using Generative AI

4. Generative AI

- d. Generative AI models can generate new content based on the data they are trained on.
- e. While discriminative AI mimics our analytical and predictive skills, Generative AI also mimics our creative skills.
- f. The creative skills of Generative AI are built on the use of models, such as GANs, VAEs, and transformers.
- g. Foundation models in Generative AI can be adapted to create specialized models or tools tailored to specific use cases.

- h. Generative AI models and tools have a broad scope for applications across different domains and industries.
- i. Generative AI can create coherent and contextually relevant content and generate realistic, high-quality images, synthetic voices, new audio, and dynamic videos.
- j. Generative AI models can generate and complete code and synthesize new data to augment existing datasets.
- k. Generative AI models can create highly realistic and complex virtual worlds, including avatars and digital personalities.

5. Final Exam Quiz

D. Generative AI: Prompt Engineering Basics

Deskripsi materi yang dipelajari :

1. The several benefits of using text prompts with LLMs effectively are increasing the explain ability of LLMs, addressing ethical considerations, and building user trust.
 - a. The interview pattern approach is superior to the conventional prompting approach as it allows a more dynamic and iterative conversation when interacting with generative AI models.
 - b. The Chain-of-Thought approach strengthens the cognitive abilities of generative AI models and solicits a step-by-step thinking process.
 - c. The Tree-of-Thought approach is an innovative technique that builds upon the Chain-of-Thought approach and involves structuring prompts hierarchically, akin to a tree, to guide the model's reasoning and output generation.

2. Prompt hacks and prompt engineering
 - a. Prompt hacking and prompt engineering are closely related fields, but they have some key differences.
 - b. Prompt hacking is the use of prompts to manipulate the output of an LLM in a way that is unexpected or unintended, whereas prompt engineering is the systematic design and development of prompts for LLMs

E. Introduction to HTML, CSS, & JavaScript

Deskripsi materi yang dipelajari :

1. Belajar HTML,
2. Belajar CSS,
3. Belajar Javascript.
4. Belajar Web development
5. Hands on Lab : coding practice
6. Final Exam Quiz
7. Final Exam Hands on Lab (coding).

F. Python for Data Science, AI & Development

Deskripsi materi yang dipelajari :

1. Belajar sekilas tentang penerapan Python yang digunakan dalam data science, web development, dan AI development.
2. Belajar Python
3. Belajar web development dengan python dan flask
4. Hands on Lab : coding practice
5. Final Exam Quiz
6. Final Exam Hands on Lab (coding)

G. Developing AI Applications with Python and Flask

Deskripsi materi yang dipelajari :

1. Belajar cara pembuatan AI sederhana yang diletakkan pada website, yang dibuat dengan Python dan Flask.
2. Hands on Lab (coding) : coding practice
3. Hands on Lab (coding) : Unit testing
4. Hands on Lab (coding) : Python packaging
5. Hands on Lab (coding) : Flask
6. Hands on Lab (coding) : API with Flask
7. Hands on Lab (coding) : Build and deploy web app
8. Hands on Lab (coding) : additional features app
9. Hands on Lab (coding) : AI sentiment analysis (good,bad)
10. Hands on Lab (coding) : AI Emotion Detector (anger,etc)
11. Final Exam Quiz
12. Final Exam Hands on Lab (coding).

H. Building Generative AI-Powered Applications with Python

Deskripsi materi yang dipelajari :

1. Belajar cara pembuatan AI Sederhana dengan Python.
2. Hands on Lab (coding) : Learn Huggingface BLIP (Image Captioning)
3. Hands on Lab (coding) : Learn Huggingface NLP (simple LLM)
4. Hands on Lab (coding) : Learn Chat API OpenAI
5. Hands on Lab (coding) : Learn Meta Llama API
6. Hands on Lab (coding) : Learn Open AI Whisper (for audio)
7. Hands on Lab (coding) : Learn Huggingface transformer pipeline speech recognition.
8. AI dengan RAG (Retrieval-Augmented Generation)

AI dengan RAG adalah kombinasi LLM dan teknik pencarian informasi, di mana model mencari data eksternal (retrieval) untuk memberikan jawaban yang lebih akurat dan kontekstual. Ini membantu AI menghasilkan respons yang lebih relevan berdasarkan sumber data terkini atau khusus.
9. Hands on Lab (coding) : Learn RAG with langchain, huggingface, chroma vector db.
10. Hands on Lab (coding) : Creating Resume Polisher AI
11. Final Exam Quiz
12. Final Exam Hands on Lab (coding)

I. Generative AI: Elevate your Software Development Career

Deskripsi materi yang dipelajari :

1. Belajar tentang kegunaan dan dampak Generative AI pada Software development di masa depan.
2. Belajar tentang hal-hal bermanfaat yang dapat dibuat dengan Generative AI.

J. Software Developer Career Guide and Interview Preparation

Deskripsi materi yang dipelajari :

1. Belajar hal-hal yang dibutuhkan saat proses interview pekerjaan software developer.
2. Belajar tentang pertanyaan-pertanyaan yang biasa dipertanyakan pada interview pekerjaan.

2.2 Hasil Uji Kompetensi

Berikut merupakan table rangkuman subjek materi-materi yang telah dikerjakan untuk mendapatkan sertifikat. Rangkuman singkat ini menunjukkan data seperti waktu selesai pengerjaan tiap materi, rata-rata lama berjalannya pengerjaan tiap materi, dan rata-rata nilai tiap materi.

Table 1. Rangkuman Nilai Tiap Module

Module	Time Completion	Avarage Learning Time	Avarage Grade
Intro to Artificial Intelligence	16 October 2024	4 weeks	94.44 %
Generative AI : Prompt Engineering Basics	10 October 2024	3 weeks	93.75 %
Intro HTML,CSS,Javascript	5 September 2024	1 weeks	91.78 %
Software Development Career Guide and Interview Preps	16 October 2024	3 weeks	81.72 %
Generative AI : Elevate Career	10 Octover 2024	3 weeks	87 %
Intro to Software Engineering	5 September 2024	6 weeks	91.30 %
Developing AI app with python and flask	16 October 2024	3 weeks	84.37 %
Generative AI : Introduction and Applications	10 October 2024	3 weeks	93.75 %
Python for Data science, AI & Development	16 October 2024	5 weeks	93.25 %
Building Gen-AI powered applications with Python	15 October 2024	6 weeks	100 %

2.3 Foto Bukti Pelaksanaan Kompetensi

A. Screenshot video training pada tiap module

1. Module Introduction to Software Engineering

Berikut merupakan contoh video training mempelajari softwar engineering.

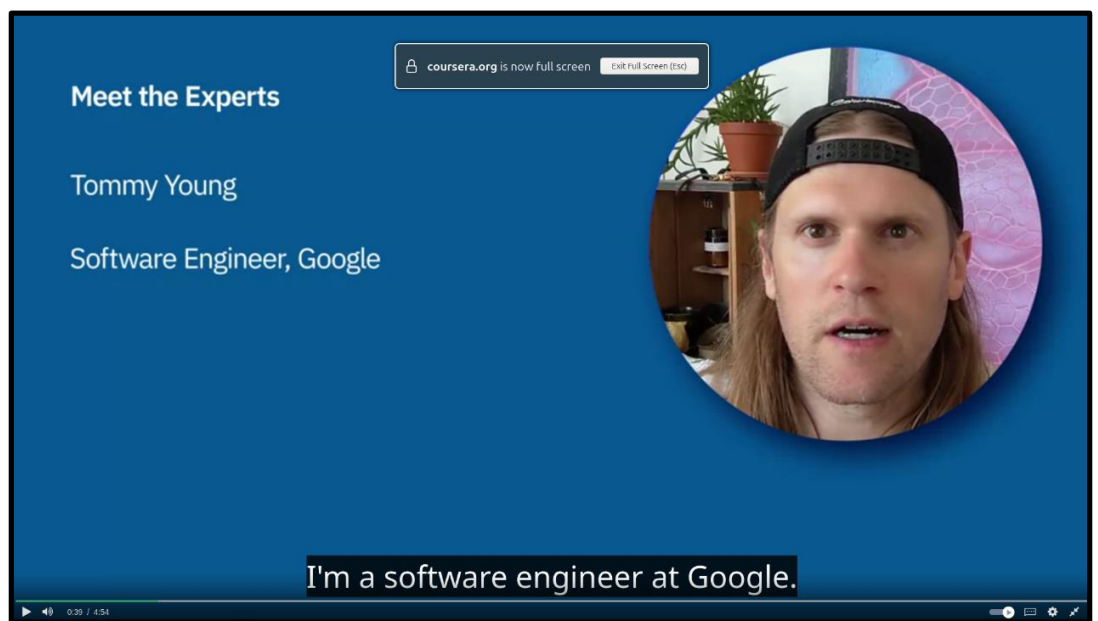


Foto 1. Video Training Software Engineering

2. Module Introduction to AI

Berikut merupakan contoh video training mempelajari Artificial Intelligence.

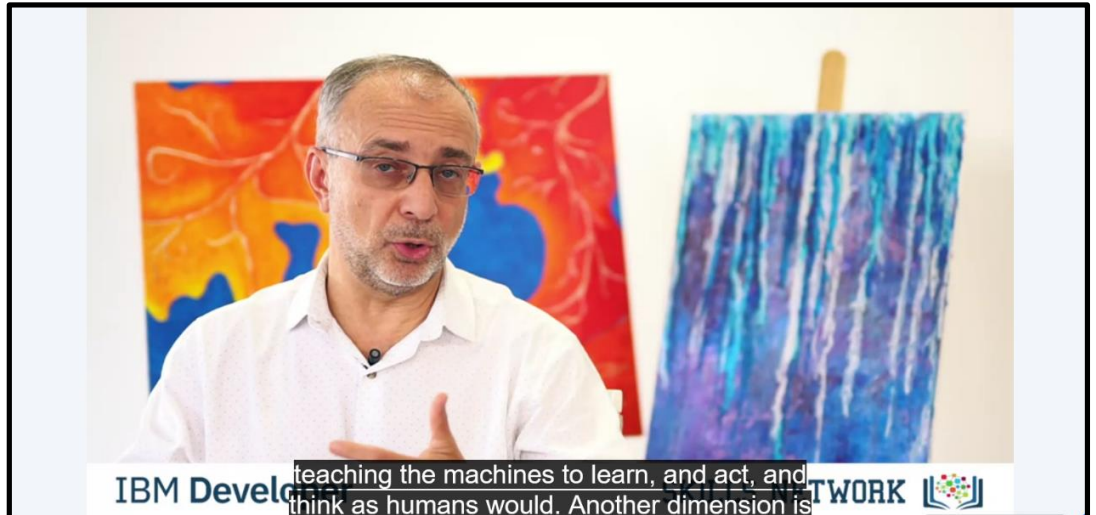


Foto 2. Video Training Introduction to AI

3. Module Generative AI: Prompt

Berikut merupakan contoh materi yang membedakan antara prompt hacks dan prompt engineering.

	Prompt hacks	Prompt engineering
Purpose	To manipulate the output of an LLM in unexpected or unintended ways	To improve the performance of an LLM on specific tasks.
Approach	Experimental and creative	Systematic and disciplined
Application	Generating humorous or creative outputs	Improving the performance of LLMs in machine translation, question answering, and other tasks

Foto 3. Document tentang Generative AI Prompt

4. Module Building Generative AI with Python

Berikut merupakan contoh video training mempelajari Generative AI

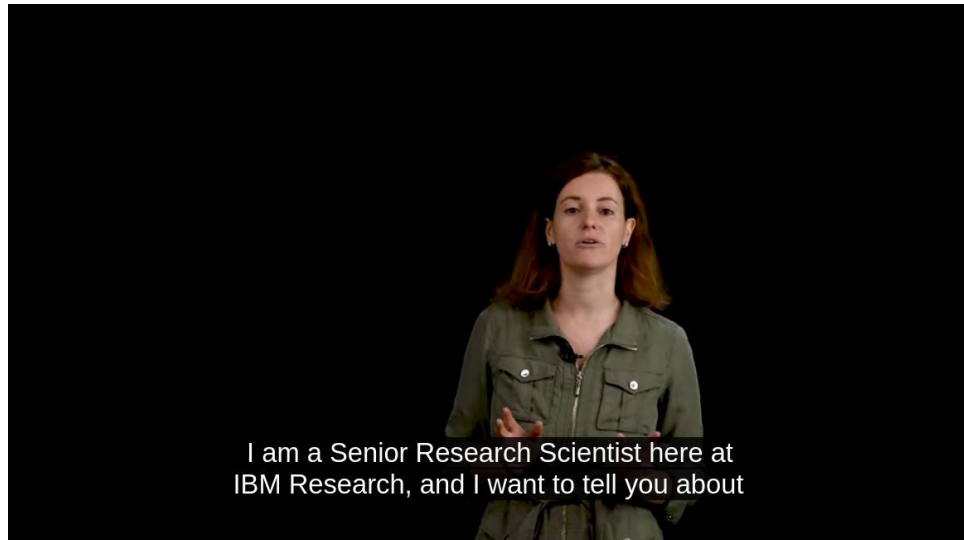


Foto 4. Video Training AI with RAG

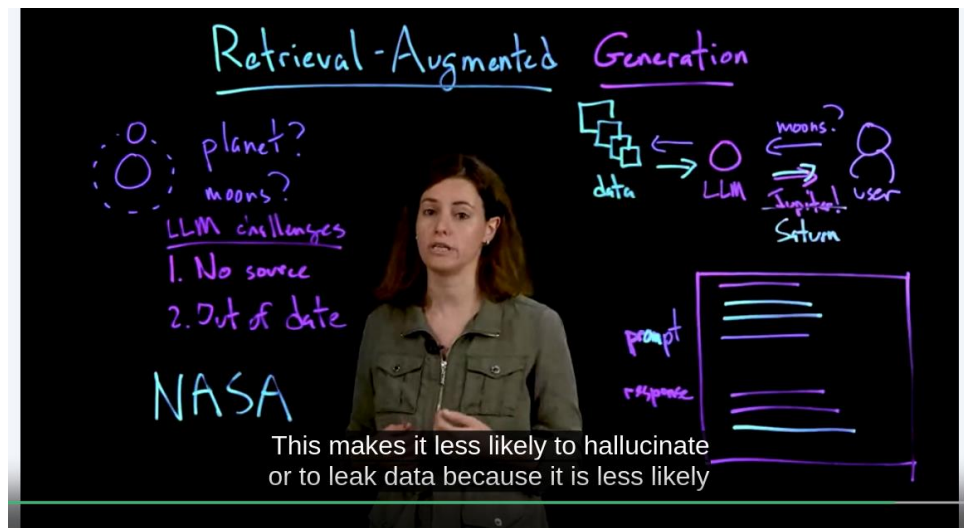


Foto 5. Video Training AI with RAG

Comparison of Tokenization and Vectorization		
Aspect	Tokenization	Vectorization
Purpose	Splits text into smaller units (tokens).	Converts tokens into numerical representations.
Output	Tokens (words, subwords, or characters).	Numerical vectors.
Techniques Used	Word, subword, character, or sentence tokenization.	One-hot encoding, embeddings, or TF-IDF.
Role in NLP	Prepares text for analysis or further processing.	Enables models to work with text data numerically.

Foto 6. Document tentang teknik dalam AI

B. Hands on Lab

Berikut merupakan contoh Hands On Lab, Online IDE yang diberikan dari IBM untuk student agar dapat menulis dan menjalankan pemrograman di website.

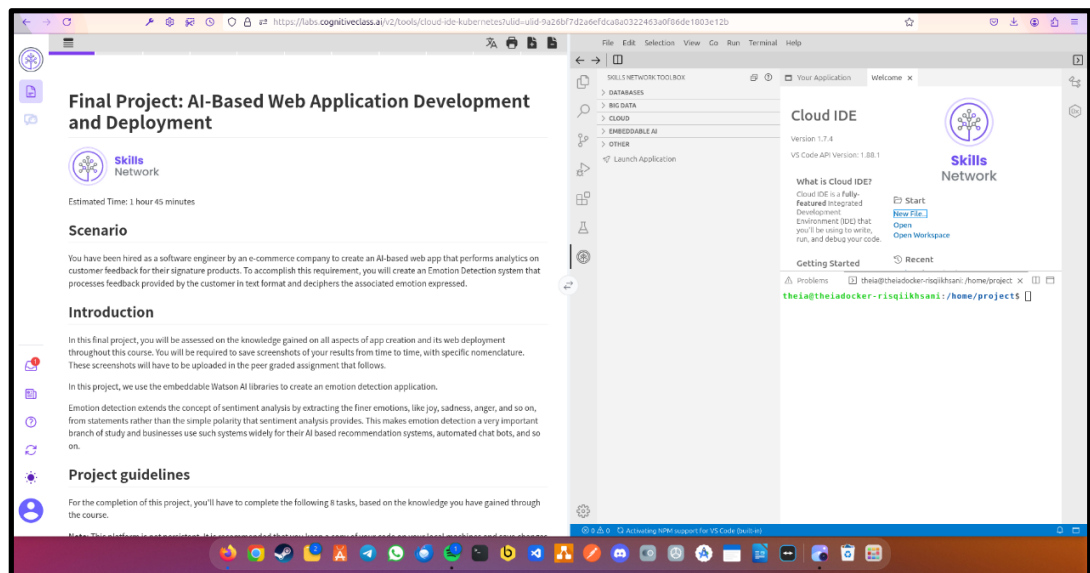


Foto 7. Contoh Hands on Lab (online IDE)

C. Project Capstone (CV/Resume Polisher AI)

Berikut merupakan aplikasi Resume Polisher AI, yang dibuat sebagai project capstone sertifikasi.

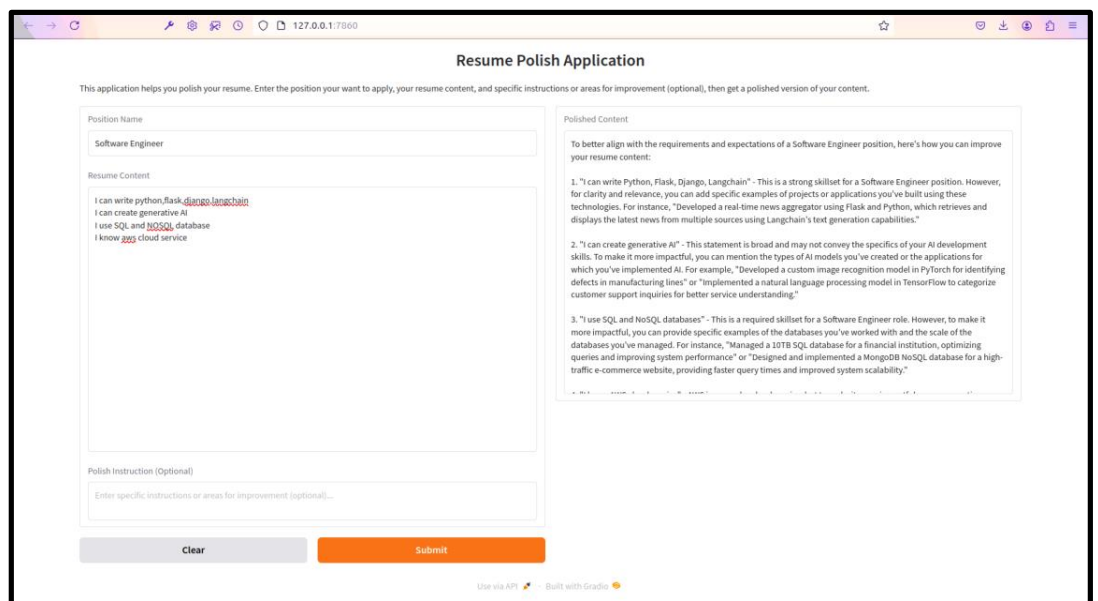


Foto 8. Project Capstone Resume Polisher AI

D. Project AI with RAG

Berikut merupakan aplikasi AI with RAG, yang dibuat untuk menerapkan proses dan prinsip Retrieval Augmented Generation AI.

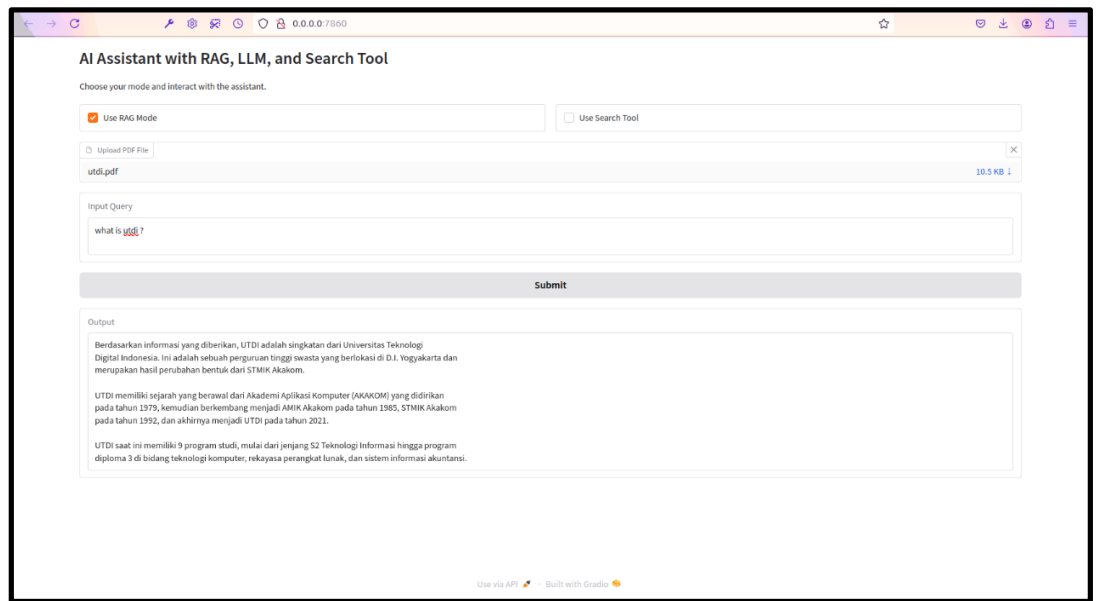


Foto 9. Project AI with RAG

E. Website Project Penerapan Generative AI

Berikut merupakan website all in one AI apps yang dikembangkan, bertujuan untuk memperlihatkan berbagai macam jenis model AI, website ini menyangkup hal-hal yang dipelajari pada sertifikasi IBM AI Developer.

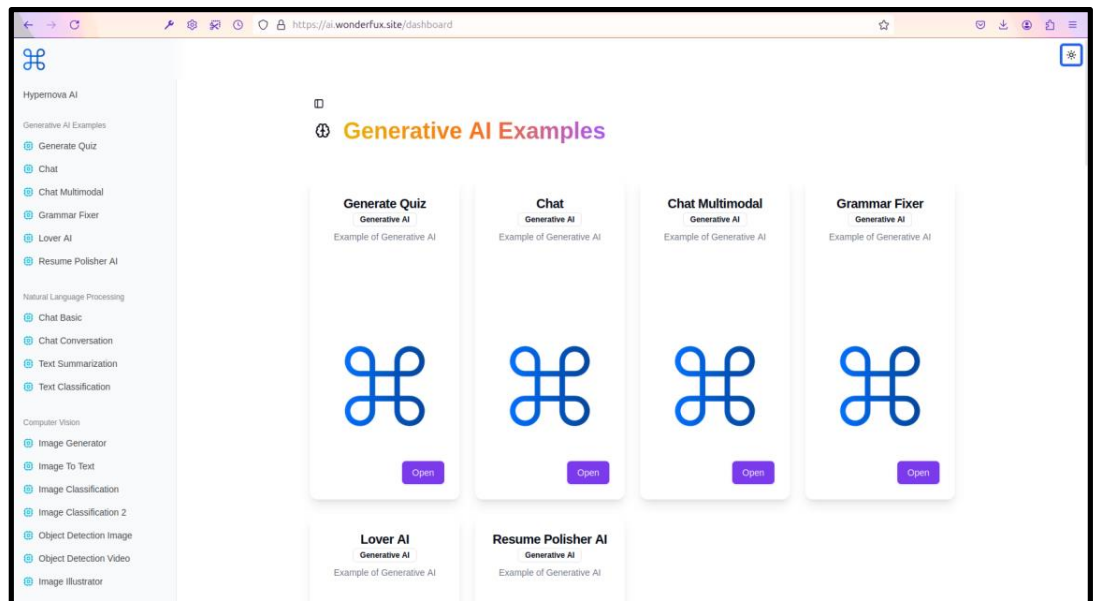


Foto 10. Project website contoh penerapan AI