Intelligent Agents

Reflection and e-portfolio

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Main e-portfolio: https://m-kanuri.github.io/ (m-kanuri, 2024, updated 2025)

Module e-portfolio: https://m-kanuri.github.io/Module6.html

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Introduction

This reflection documents my learning experience in the Intelligent Agents module. I worked with my team to build the Intelligent Forensics Agent, designed to automate file identification, process the data, and securely archive specified file types for analysis. In this reflection, I will critically analyse my collaborative development experience, the technical knowledge I acquired, and how the module influenced my understanding of intelligent systems. Using Rolfe et al.'s (2001) reflective framework, I outline *what* occurred during the module, *so what* these experiences meant for my professional and personal growth, and *now what* actions I will take to apply this learning in future contexts.

WHAT – Description of Experience

The module covered core intelligent-agent concepts: reactive, deliberative, and hybrid architectures, agent communication, Natural Language Processing (NLP), and adaptive methods, including Artificial Neural Networks (ANNs).

In Unit 6, I coordinated the team by setting up our communication channels, structuring tasks in JIRA, and chairing regular check-ins. I supported the digital forensics analysis, reviewed and organised the GitHub repository, and contributed to the final report and peer reviews. This sharpened my planning discipline and showed how clear roles, lightweight processes, and visible timelines lift overall quality.

We faced practical challenges in coordinating across time zones, merging our work on GitHub, and agreeing on consistent performatives (ask-if, tell, perform). Content-based identification (e.g., comparing `python-magic` with file-extension heuristics), safe cross-platform scanning (`psutil`), and a read-only, auditable flow became key design anchors. Learning about Hybrid Architectures (Unit 4) and Communication Languages (Unit 5) clarified how deliberative reasoning can complement reactive behaviour even in a primarily single-agent system so that quick responses do not block longer-running goals.

Throughout the module, the collaborative discussions (agent-based systems, agent communication languages, and Deep learning in action) allowed me to analyse topics such as hybrid architectures and the advantages and limitations of agent communication languages like KQML

(Knowledge Query and Manipulation Language). Later units (e.g., parse-tree ideas in Unit 8 and deep-learning concepts in Unit 10) showed how systems parse inputs and adapt from data, which I related back to our pipeline's identify-and-archive stages.

SO WHAT – Analysis and Interpretation

Working on the digital-forensics agent had a tangible emotional and intellectual impact. Early on, I felt anxious about the project's breadth—making file-type detection reliable, keeping scans read-only and safe across platforms, and integrating these pieces into a coherent discover-identify-decide-act-audit pipeline. Iterative sprints, small spikes, and peer feedback reduced this anxiety. As our tests passed and the SQLite-based metadata trail and modular parsers held up, I moved from uncertainty to curiosity to ownership. One key lesson is that we waited too long to build automated test pipelines.

I found my learning strongly echoed Kolb's (1984) experiential cycle. With every sprint and code review, I moved through the phases of concrete experience, reflection, conceptualisation, and experimentation, making the process much more active. The discussions and GitHub pull requests significantly boosted my confidence. I learned how to communicate technical ideas succinctly, negotiate design decisions effectively, and accept feedback without defensiveness, all vital behaviours for professional teamwork.

The Module Wiki in Unit 4 reinforced a shared understanding. Contributing to and reading succinct, referenced entries on key terms (e.g., hybrid agents, performatives, provenance) encouraged independent research and collective meaning-making. These concepts informed my decision to keep a reactive message handler for responsiveness while a deliberative module processed goals in the background.

Academically, the module deepened my grasp of agent-based computing, especially its focus on autonomy, social ability, and proactivity (Wooldridge, 2009). Our project bridged theory and practice: speech-act theory (Searle, 1969) helped me reason about message intent; KQML highlighted the value of explicit semantics but also the engineering trade-off versus simple method calls; and readings on semantic alignment

(Payne & Tamma, 2014) reminded me that interoperability and shared meaning are as critical as functional correctness. We ultimately favoured lightweight, explicit message schemas over full ACL (Agent Communication Language) complexity sufficient for our scope without over-engineering.

Our team dynamics closely followed Tuckman's (1965) stages. The 'Storming' phase was initially stressful, with disagreements over coding priorities and code structure. Adding a shared branching model, a Pull Request (PR) template, and a brief "definition of done" (tests + documentation + lint) cut down on merge conflicts in the next sprint. As the team grew, I noticed that trust and communication standards improved, which greatly benefited both the speed of our project and the quality of our code.

Ethically, studying AI incidents and governance (Nasim et al., 2022) sharpened my view that even seemingly mundane automation (like file discovery) needs accountability: provenance and audit trails, least-privilege access, clear scope boundaries, and transparent reporting. These considerations influenced our read-only default, metadata logging, and preference for content-based over name-based identification.

Finally, in Unit 11, I extended the work individually by putting the Unit 6 design in practice. By focusing on end-to-end execution and adding unit tests, I was able to solidify my learning. This process quickly revealed gaps such as lower test coverage or issues with edge-case handling that I promptly addressed through small refactors and clearer documentation.

NOW WHAT – Future Actions and Application

This module has reshaped how I learn and deliver. Reflection is no longer a post-hoc report but a continuous improvement habit. In future projects, I will schedule short reflective checkpoints at sprint boundaries and tie them to concrete actions (e.g., a test to add, a doc to clarify, a risk to retire).

Technically, I plan to explore agent-based simulation (e.g., Mesa) to test coordination strategies and to prototype reinforcement learning for adaptive behaviours where safe and justified. Exposure to NLP and deep learning prompts me to investigate how compact language interfaces (not

full ACLs) can make agent interactions more natural while preserving auditability.

Professionally, I will continue using GitHub to document contributions transparently and practise ethical engineering principles (provenance, minimum necessary data, clear user consent). Our teamwork underlined the value of clear documentation, equitable task allocation, and empathy in distributed settings habits I will carry into real-world AI projects.

Ultimately, the module reinforced that effective intelligent systems combine technical rigour with ethical reflection, and that continual learning is essential in a fast-moving field.

Conclusion

The Intelligent Agents module moved me from theoretical interest to practical capability. I learned that teamwork, critical thinking, and ethics are as important as code quality and that small, well-evidenced design choices (read-only defaults, metadata trails, modularity) compound into trustworthy systems. I attended all seminar sessions led by the module tutor (Samuel Danso), which strengthened my academic grounding and prepared me to contribute responsibly to intelligent systems in practice.

The appendix includes my e-portfolio details and covers e-portfolio elements and formative activities.

References

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Appendix A: e-portfolio artefacts and repositories

This appendix provides verifiable links to my team and individual contributions (discussion posts, reports, code repositories, and activity artefacts) to evidence collaboration.

Units	Artefacts & Repositories
Main Page	https://m-kanuri.github.io/
IA Module	https://m-kanuri.github.io/Module6.html
Unit 1	1) Main Page • https://m-kanuri.github.io/module6/2025/07/29/IA-Unit1.html

	2) Collaborative Discussion 1 – Agent Based Systems • **Initial Post:** https://m-kanuri.github.io/artefacts/IA-Unit01-Initial_Post.pdf 3) Module Wiki • https://m-kanuri.github.io/artefacts/IA-Unit04-Module_Wiki.pdf
Unit 2	1) Main Page • https://m-kanuri.github.io/module6/2025/08/05/IA-Unit2.html 2) Collaborative Discussion 1 – Agent Based Systems • **Peer Response:** https://m-kanuri.github.io/artefacts/IA-Unit01-Peer_Response.pdf
Unit 3	1) Main Page • https://m-kanuri.github.io/module6/2025/08/12/IA-Unit3.html 2) Collaborative Discussion 1 – Agent Based Systems • **Summary Post:** https://m-kanuri.github.io/artefacts/IA-Unit01-SummaryPost.pdf
Unit 4	1) Main Page • https://m-kanuri.github.io/module6/2025/08/19/IA-Unit4.html 2) Module Wiki • https://m-kanuri.github.io/artefacts/IA-Unit04-Module_Wiki.pdf (Continued till end of the module)
Unit 5	1) Main Page • https://m-kanuri.github.io/module6/2025/08/26/IA-Unit5.html 2) Collaborative Discussion 2 – Agent Communication Languages • **Initial Post:** https://m-kanuri.github.io/artefacts/IA-Unit05-Initial_Post.pdf
Unit 6	1) Main Page • https://m-kanuri.github.io/module6/2025/09/02/IA-Unit6.html 2) Creating Agent Dialogues • Activity Guidance: https://m-kanuri.github.io/artefacts/IA-Unit06-CreatingAgentDialogues.pdf 3) Collaborative Discussion 2 – Agent Communication Languages • **Peer Response:** https://m-kanuri.github.io/artefacts/IA-Unit05-Peer_Response.pdf

	4) Development Team Project • https://m-kanuri.github.io/artefacts/IA-Unit06-DevelopmentTeamProjectReport.pdf
Unit 7	1) Main Page • https://m-kanuri.github.io/module6/2025/09/09/IA-Unit7.html 2) Collaborative Discussion 2 – Agent Communication Languages • **Summary Post**: https://m-kanuri.github.io/artefacts/IA-Unit05-SummaryPost.pdf
Unit 8	1) Main Page • https://m-kanuri.github.io/module6/2025/09/16/IA-Unit8.html 2) Parse Tree • https://m-kanuri.github.io/artefacts/IA-Unit08-Parse_Tree.pdf
Unit 9	1) Main Page • https://m-kanuri.github.io/module6/2025/09/23/IA-Unit9.html 2) Collaborative Discussion 2 – Agent Communication Languages • **Initial Post:** https://m-kanuri.github.io/artefacts/IA-Unit09-Initial_Post.pdf
Unit 10	1) Main Page • https://m-kanuri.github.io/module6/2025/09/30/IA-Unit10.html 2) Collaborative Discussion 2 – Agent Communication Languages • **Peer Response:** https://m-kanuri.github.io/artefacts/IA-Unit09-Peer_Response.pdf
Unit 11	1) Main Page: • https://m-kanuri.github.io/module6/2025/10/07/IA-Unit11.html 2) Collaborative Discussion 2 – Agent Communication Languages • **Summary Post:** https://m-kanuri.github.io/artefacts/IA-Unit09-SummaryPost.pdf 3) Development Individual Project • Presentation: https://m-kanuri.github.io/artefacts/IA-Unit11-Development%20Individual%20Project-%20Presentation.pdf

	• Transcript : https://m-kanuri.github.io/artefacts/IA-Unit11-Development%20Individual%20Project%20-%20Transcript%20Text.pdf • GitHub Repo: https://github.com/m-kanuri/ia_agent
Unit 12	1) Main Page: • https://m-kanuri.github.io/module6/2025/10/14/IA-Unit12.html 2) Reflection: This document 3) e-portfolio: • https://m-kanuri.github.io/ (m-kanuri, 2024, updated 2025) • https://m-kanuri.github.io/Module6.html

Appendix B: Unit 6 Team E Project Report

JIRA Board

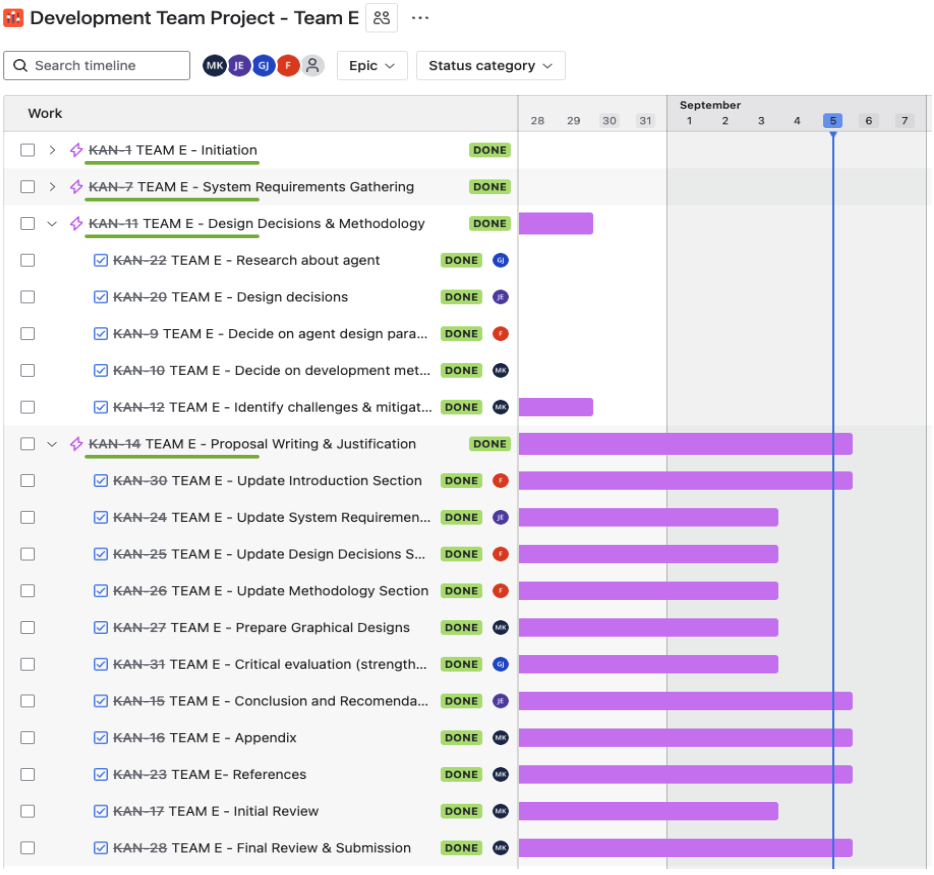


Figure B1: JIRA Board from Unit 6 Team E Project Report, adapted from Kanuri et al. (2025a) and Kanuri (2025b). Source: Author's own work.

GitHub Repository

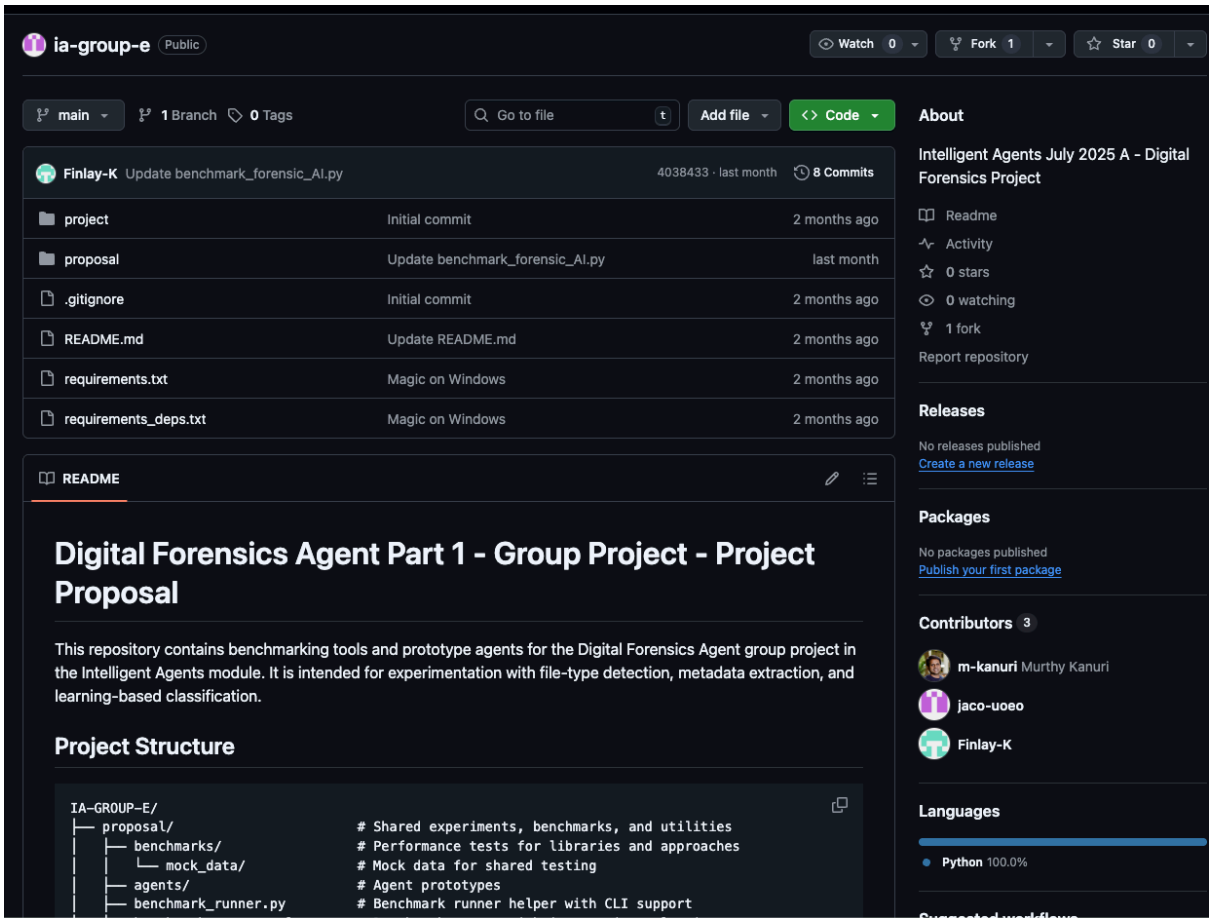
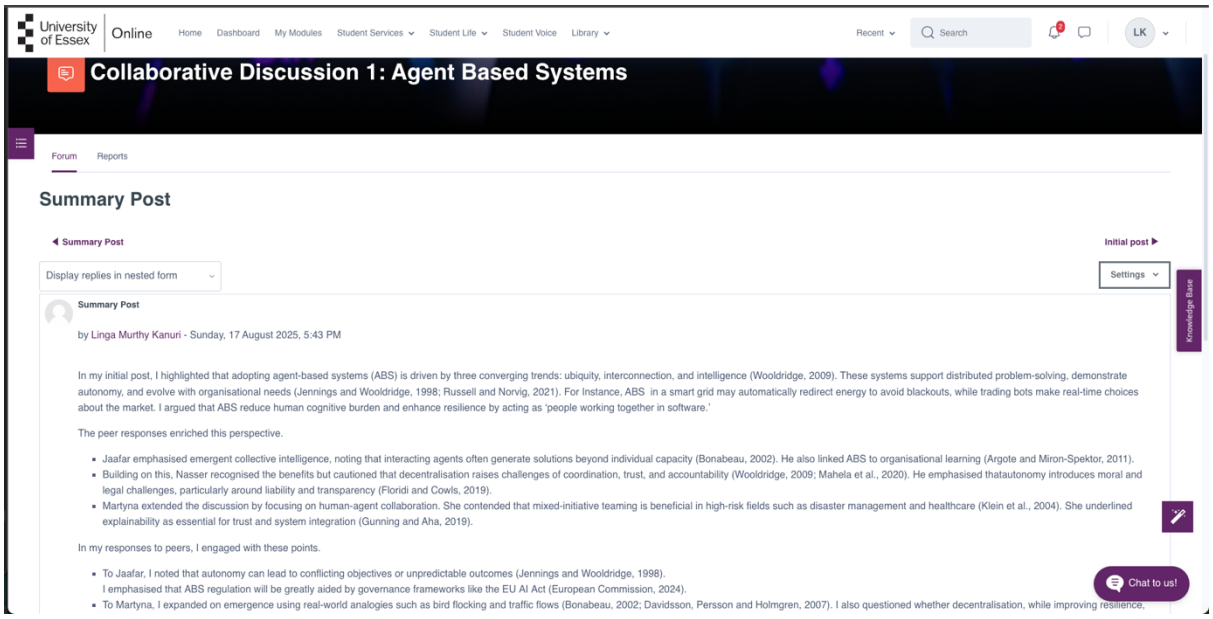
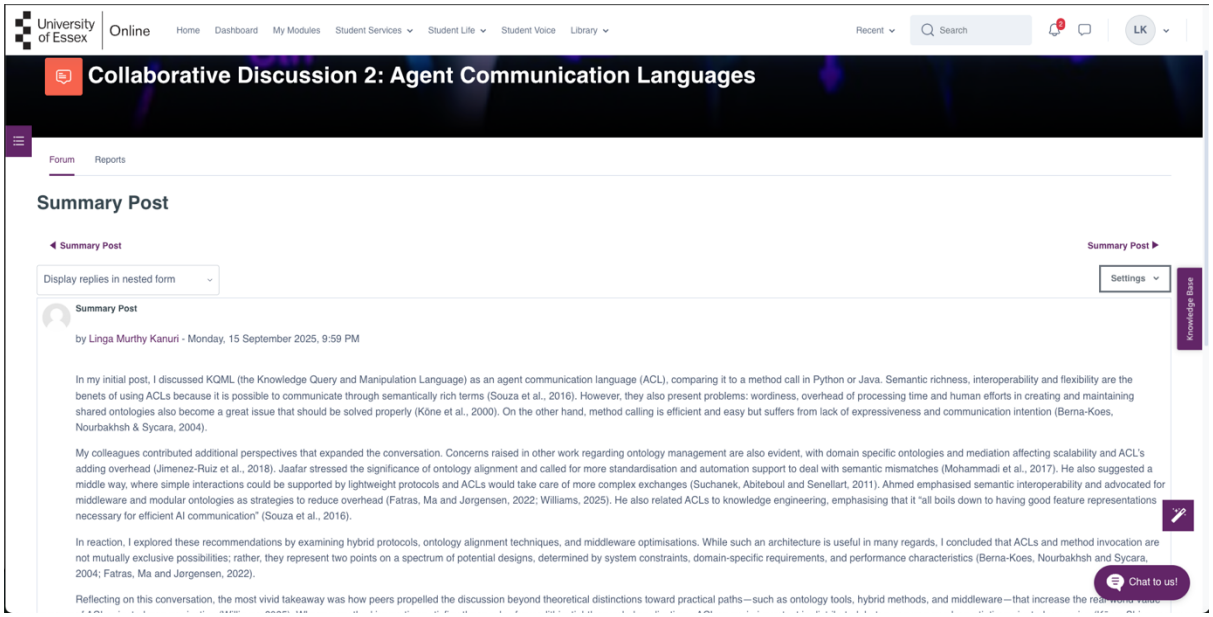


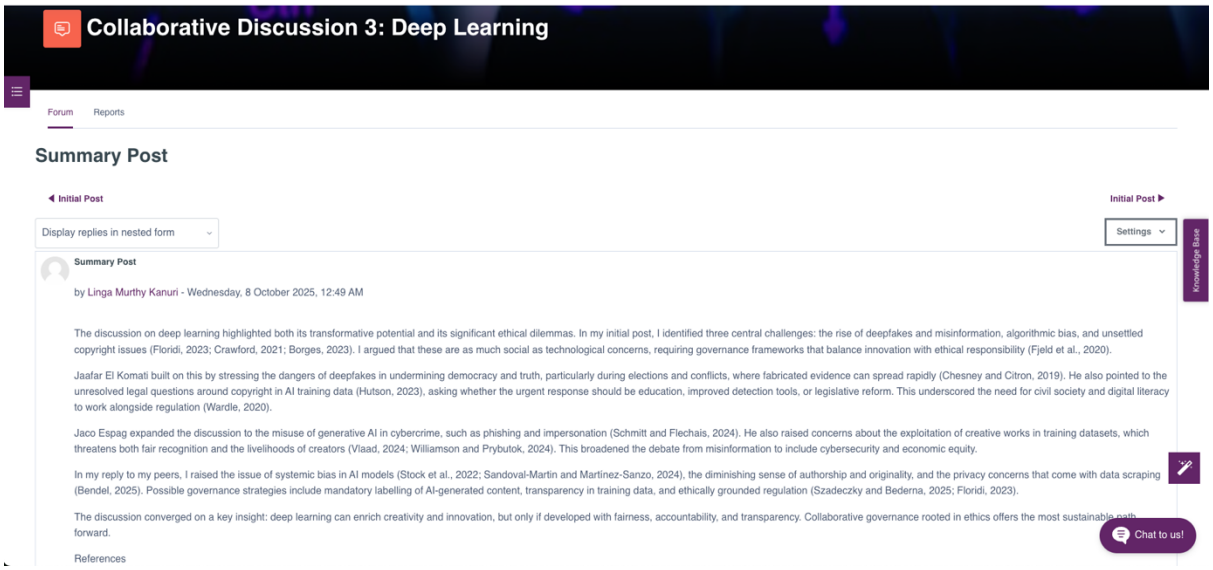
Figure B2: GitHub repository contributions from Unit 6 Team E Project Report, adapted from Kanuri et al. (2025a) and Kanuri (2025b). Source: Author's own work.

Appendix C: Selected e-portfolio evidence

Collaborative Discussions







Figures C1-C3: Screenshots showing the Summary post of the collaborative discussions

Module Wiki

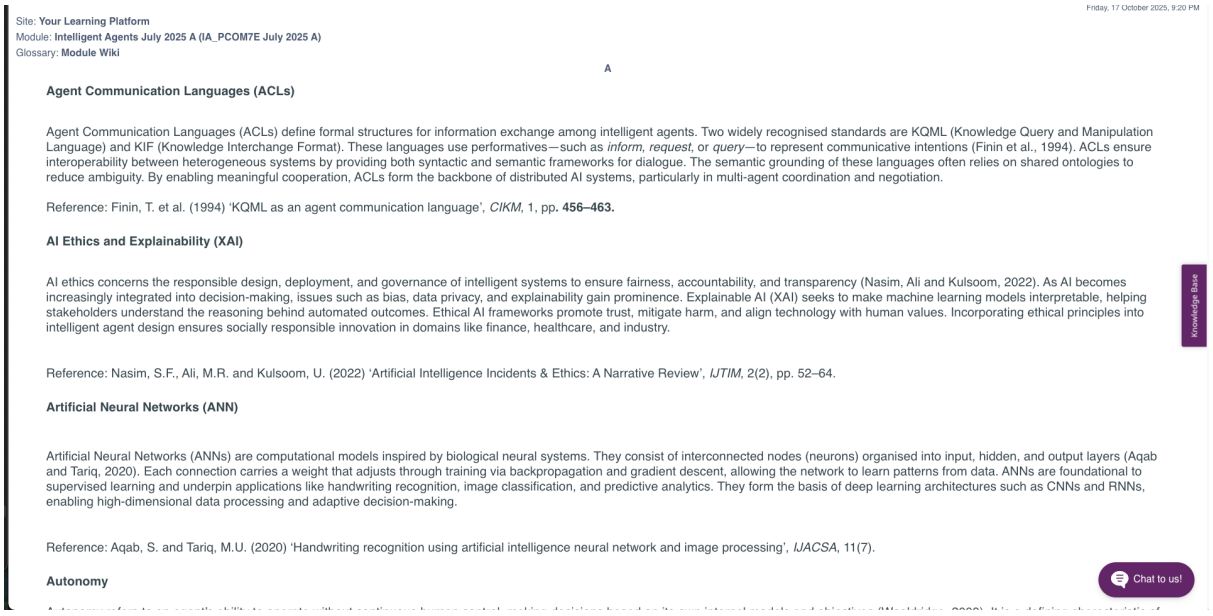


Figure C4: Screenshot showing the contribution to Module Wiki

Creating Parse Trees

The following figures illustrate my work from the *Parse Tree Creation* exercise, demonstrating syntax structure and parsing stages for different sample sentences.

1) The government raised interest rates.

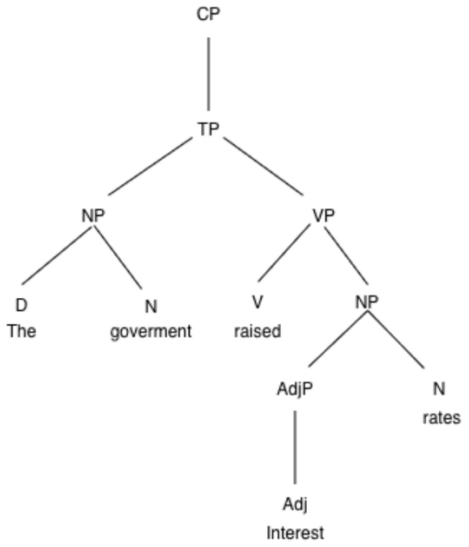


Figure 1. *Constituency parse tree for "The government raised interest rates." (Created using draw.io.)*

2) The internet gives everyone a voice.

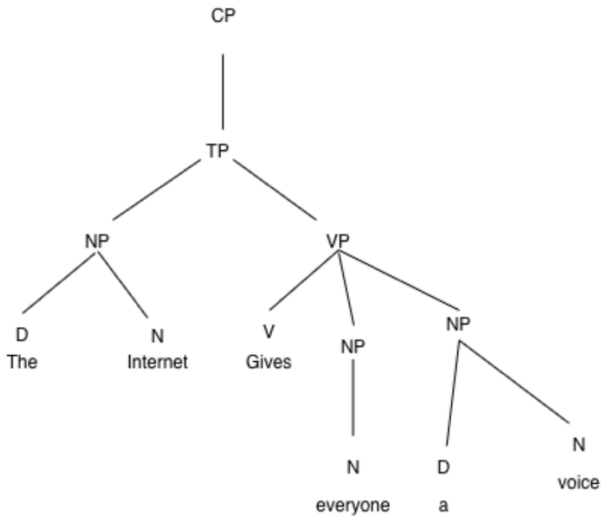


Figure 2. Constituency parse tree for "The internet gives everyone a voice." (Created using draw.io.)

3) The man saw the dog with the telescope.

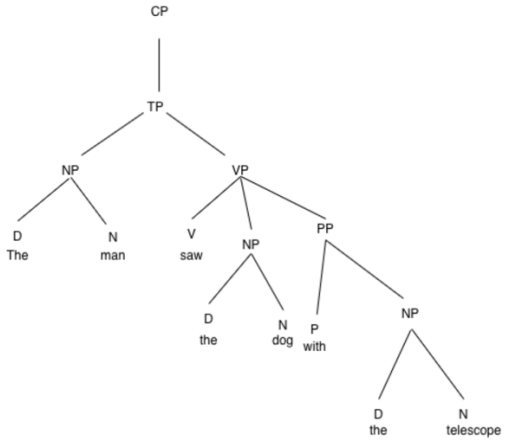


Figure 3. Constituency parse tree for "The man saw the dog with the telescope." (Created using draw.io.)

Figures C5-7: Screenshots showing the Parse tree exercise answers

Deep Learning in Action

Overview of the Technology (What it Does)

This technology uses deep learning—typically convolutional neural networks (CNNs)—to analyse medical images such as X-rays, MRIs, CT scans and pathology slides (Esteva et al., 2017; Ardila et al., 2019). The aim is to detect, classify and quantify disease features that may be subtle or hard for the human eye to identify consistently. Applications include early cancer detection (e.g., lung nodules, skin lesions) and screening for diabetic retinopathy (Gulshan et al., 2016), with potential to improve reporting consistency and throughput, and—if evaluated across diverse populations—to support health equity (WHO, 2021).

Brief Synopsis of How it Works

Deep models require large, labelled datasets—typically thousands of expert-annotated images (Esteva et al., 2017).

- **Training:** The CNN learns spatial patterns linked to disease (e.g., texture/morphology separating malignant tumours from benign tissue).
- **Feature extraction:** Deep nets learn hierarchical features directly from data, avoiding manual feature engineering (LeCun, Bengio & Hinton, 2015).
- **Prediction:** In deployment, the model processes a new **unlabelled** scan and outputs a probability (e.g., likelihood of malignancy) to assist the clinician; many pipelines add **explanations** (e.g., Grad-CAM heatmaps) for transparency (Selvaraju et al., 2017).

Potential Socio-Technical Impacts (Ethics, Privacy, Fairness)

Using deep learning in high-stakes industries like health raises several important ethical and social issues.

Figure C8: Screenshot showing the Deep Learning in Action document and link shared in e-portfolio links.

GitHub Repository for Individual Project

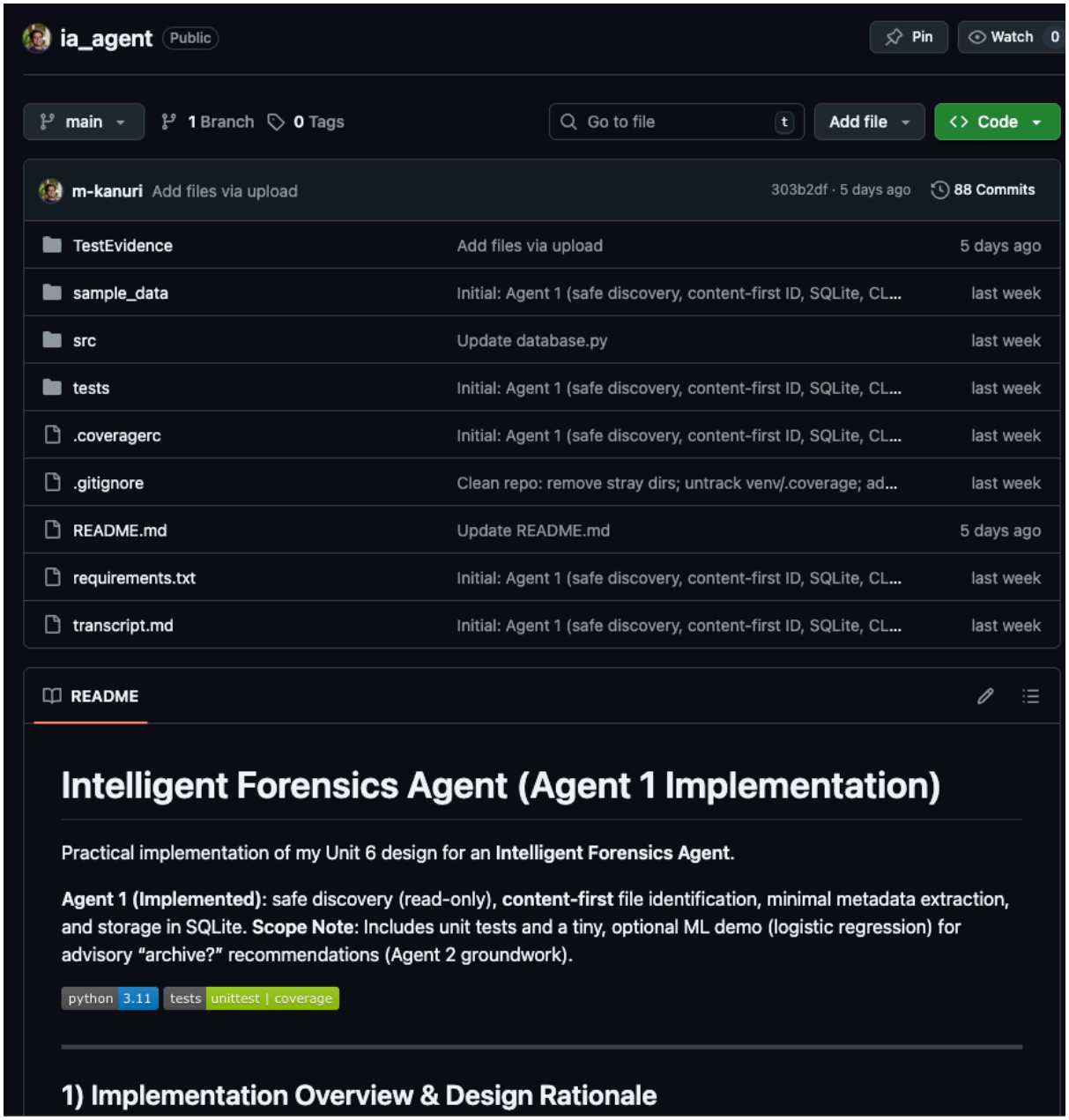


Figure C9: GitHub Repository from *Unit 11 Development Individual Project Presentation*, adapted from Kanuri (2025c). Source: Author's own work.

SQLite Screenshot

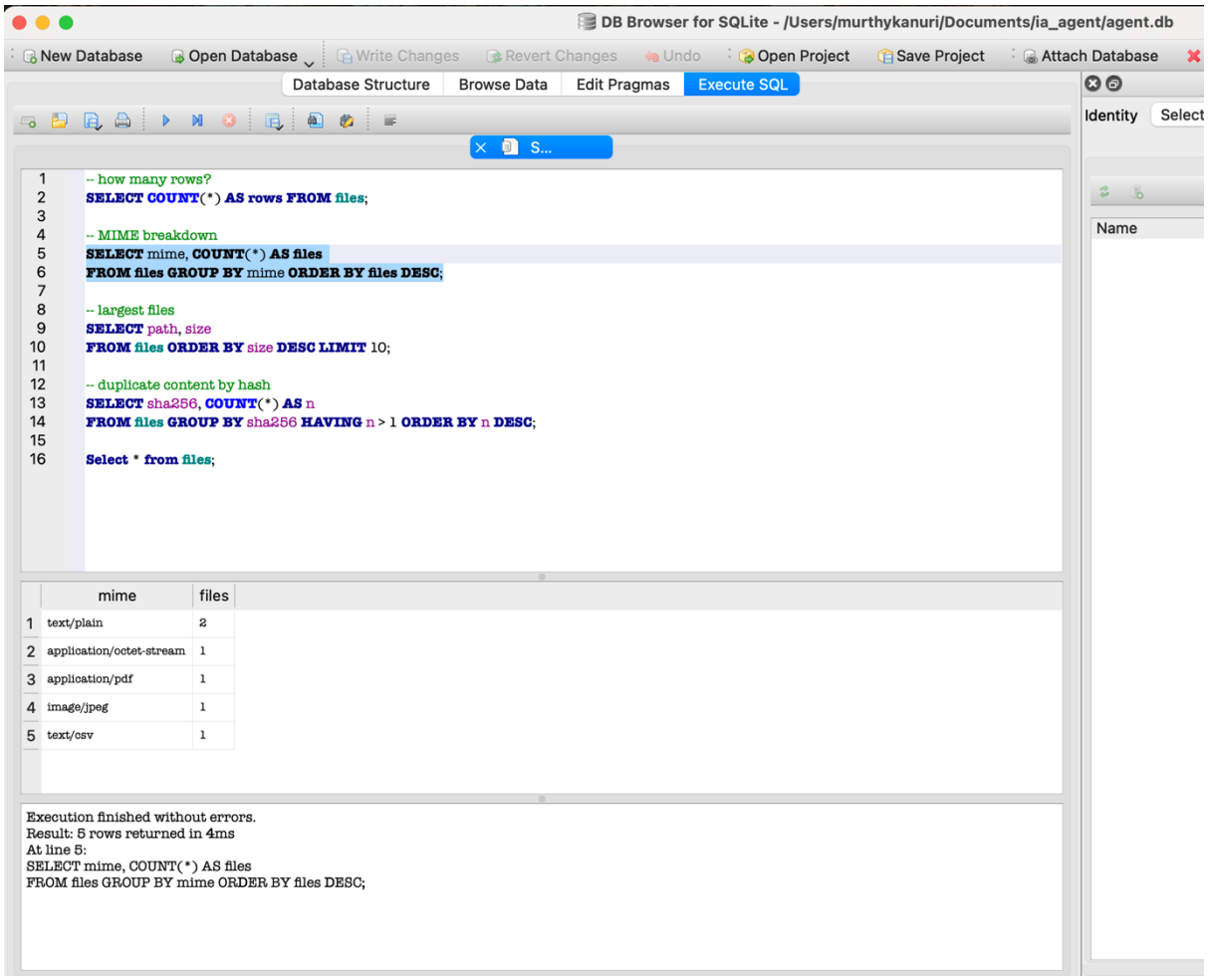


Figure C10: SQLite Screenshot from *Unit 11 Development Individual Project Presentation*, adapted from Kanuri (2025c). Source: Author's own work.

Appendix D: Personal Skills Matrix and Action Plan (PDP)

SKILL	LEVEL	EVIDENCE	ACTION PLAN
TIME MANAGEMENT	Expert	Attending all the seminar sessions, meeting all deadlines. Over 25 years of professional experience working on IT projects.	Continue to manage the time effectively, delivering work on schedule and maintaining quality results.
CRITICAL THINKING AND ANALYSIS	Proficient	Evaluated the advantages and limitations of hybrid agent architectures. Analysed case studies on AI ethics and decision-making in autonomous systems.	Strengthen by applying structured evaluation frameworks (e.g., SWOT or ethical impact analysis) to future AI design tasks.
COMMUNICATION AND LITERACY	Proficient	Contributed actively to all the collaborative discussions. Moderated the Team E group project as a project Manager	Improve by producing concise technical summaries and enhancing clarity in collaborative documentation.
IT AND DIGITAL	Advanced	Developed, tested, and maintained code for intelligent agent systems using Python and GitHub.	Continue exploring advanced AI frameworks (e.g., TensorFlow, spaCy) and apply version control best practices in future development.
NUMERACY	Intermediate	Applied quantitative reasoning to evaluate the accuracy and loss functions of ANN models in the *Deep Learning in Action* activity. Used data outputs and confusion matrices to assess model performance.	Enhance numerical analysis by studying statistical validation methods such as cross-validation and standard deviation in model testing. Incorporate data visualisation to communicate performance metrics clearly.
RESEARCH	Advanced	Conducted literature review on AI ethics and evolution; correctly applied Harvard referencing in e-portfolio reflections.	Continue systematic literature searches; summarise two new AI-ethics articles each month for ongoing professional development.
INTERPERSONAL	Proficient	Collaborated effectively within the Unit 6 development team and peer-review tasks; demonstrated accountability and adaptability.	Take leadership or coordination roles in future projects; mentor peers to

			strengthen facilitation and negotiation skills.
PROBLEM SOLVING	Advanced	Diagnosed coding issues during the team project and individual development project. Integrated feedback from peers to improve functionality.	Formalise a debugging checklist (repro steps, logs, tests, fix, verify); increase test coverage (unit/integration) for agent modules; run post-mortems after defects to capture lessons learned in the e-portfolio.
ETHICAL AWARENESS	Proficient	Reflected on ethical implications of intelligent agents in discussions and portfolio; considered bias and accountability.	Expand understanding through IEEE and ACM ethical AI frameworks; integrate ethics checklists in future system designs.

Appendix E: Skills Matrix

- Consolidated skills matrix can be found here: https://github.com/m-kanuri/m-kanuri.github.io/blob/main/artefacts/Skills%20Matrix.xlsx