

AI and machine learning – pre-reading

- **Traditional programming is logic-driven:** Think of this as a "**recipe**." The programmer writes every single "IF/Then" statement. For example, if the email contains the word "Winner" then put it in the spam folder. The problem is that scammers just change the word to "Winnner" or "W1nner," and the rules break.
- **Artificial intelligence (AI):** The broadest concept. Any technique that enables computers to mimic human intelligence (e.g., reasoning, logic, decision-making).
- **Machine learning (ML):** A *subset* of AI. It's the specific method of achieving AI by using statistical techniques to let computers "learn" from data rather than following a script.

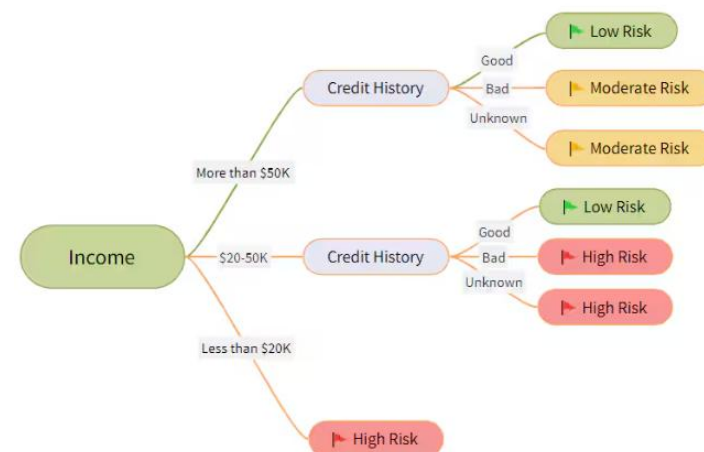
How does AI 'see'? (Image Classification)

Computers don't see "pictures"; they see a grid of numbers representing colours and brightness. To an AI, an image of a skin mole is just a pattern of data. Through **machine learning**, we show the computer thousands of images labelled "healthy" or "unhealthy." The AI looks for patterns (features) like jagged edges or different colours.

How AI Decides (Decision Trees)

One of the simplest ways an AI makes a prediction is by using a **decision tree**. Think of it like a "flowchart" or a game of *20 questions*.

- It asks a question (e.g., "Is the spot itchy?").
- Based on the answer (Yes/No), it follows a branch to the next question.
- Eventually, it reaches a "leaf" (the final prediction).



How AI Learns: Supervised Learning

Imagine you are teaching a child to recognise different types of fruit. You show them a picture of an apple and say, "*This is an Apple.*" You show them a banana and say, "*This is a banana.*" In AI, this is called **Supervised Learning**.

- **The Labels:** The names you give the fruit ("Apple", "Banana") are called **Labels**.
- **The Training:** We feed the AI thousands of examples of **labelled data**. The AI looks at the pixels to find patterns, like the roundness of an apple or the curve of a banana.

- **The Prediction:** Once the "training" is finished, we give the AI a new photo it has never seen before. It uses the patterns it learned to make a **prediction** (e.g., *"I am 95% sure this is a banana"*).

If the AI gets it wrong, we don't change the code; we give it *better data* to learn from.

Inspiring case studies on how artificial intelligence is being explored, developed, and utilised in the world today.

Real world applications	The problem	AI Hero	The work	Message
AI for Health	Radiologists in the UK are overworked, and early cancer detection is a "needle in a haystack" problem.	Dr. Nicola Strickland a leading UK radiologist who has championed the use of AI in the NHS.	Using AI to pre-screen chest X-rays. The AI "triages" the scans, putting the most suspicious ones at the top of the doctor's pile so patients are diagnosed in days, not weeks.	You don't have to choose between being a doctor and a computer scientist. You can be both.
AI for the Planet	We are losing biodiversity faster than we can track it.	Researchers at Liverpool John Moores University	They created "Conservation AI," which uses the exact "Snow Leopard" logic from your activity. Their models identify animals in real-time from drone footage, helping to catch poachers and protect endangered species across the globe.	AI is the most powerful tool we have to protect the natural world from climate change.
AI for Accessibility	How does a visually impaired person "see" a menu or know if a friend is smiling?	While Saqib led the project, the team at Microsoft UK includes many specialising in Human-Computer Interaction (HCI).	Seeing AI. An app that narrates the world. It uses the "Image Classification" logic from your live demo to read text, identify currency, and even describe people's emotions to the user.	AI is about empathy. It's about building tools that make the world accessible for everyone.
AI for Fairness	Why does a search engine show "CEO" images as only men? Or why do facial recognition systems fail on darker skin?	Ethicists (many based in UK universities like De Montfort).	They are the "Data Detectives." They study algorithmic bias and force big tech companies to retrain their models to be fair and inclusive.	AI needs 'human critics.' If you care about social justice and fairness, AI needs your voice to ensure the code isn't biased.

It is not just about code, many people did not start as programmers; they started in **geography, biology, psychology, or art**. The UK is a global leader in "AI ethics" and "AI for social good." We need people who care about humans, not just computers.