

AI Future Directions Assignment

Course: PLP AI for Software Engineering

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Q1 — How Edge AI reduces latency and enhances privacy

Edge AI runs models on the device near the user (phone, camera, drone, Raspberry Pi) instead of sending data to a remote cloud. That means decisions happen immediately (low latency) and sensitive raw data never leaves the device (better privacy).

Why latency is lower: network roundtrips to cloud servers are removed. A camera can classify a frame locally in tens of milliseconds instead of waiting for upload + server processing.

Why privacy is better: raw data (images, audio) stays on the device; only aggregated results (e.g., “object = plastic bottle”) or anonymized summaries are sent if needed.

Real-world example: autonomous drone inspecting power lines. The drone must detect faults immediately and cannot rely on network; running a lightweight model on-board lets it react in real time and avoids sending raw video over networks.

Q2 — Quantum AI vs classical AI for optimization

Classical AI uses algorithms on classical computers; Quantum AI explores using quantum hardware (qubits) and quantum algorithms (e.g., QAOA) to solve certain optimization problems faster or differently.

Key differences

- **Classical:** good, reliable today — many heuristics (genetic algorithms, gradient descent).
- **Quantum:** potentially can search complex solution spaces more efficiently for specific problems, but hardware is still early and noisy.

Industries that could benefit most:

- Logistics & route optimization (shipping, delivery).
- Finance (portfolio optimization).
- Drug discovery (combinatorial search of molecular structures).
- Material science and large-scale scheduling.