

Teaching AI to Abstain When Uncertain

Noise-Aware Deep Learning for Reliable Diagnosis from Noisy Image Data

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3 GOOD HEALTH AND WELL-BEING



9 INDUSTRY, INNOVATION AND INFRASTRUCTURE



11 SUSTAINABLE CITIES AND COMMUNITIES

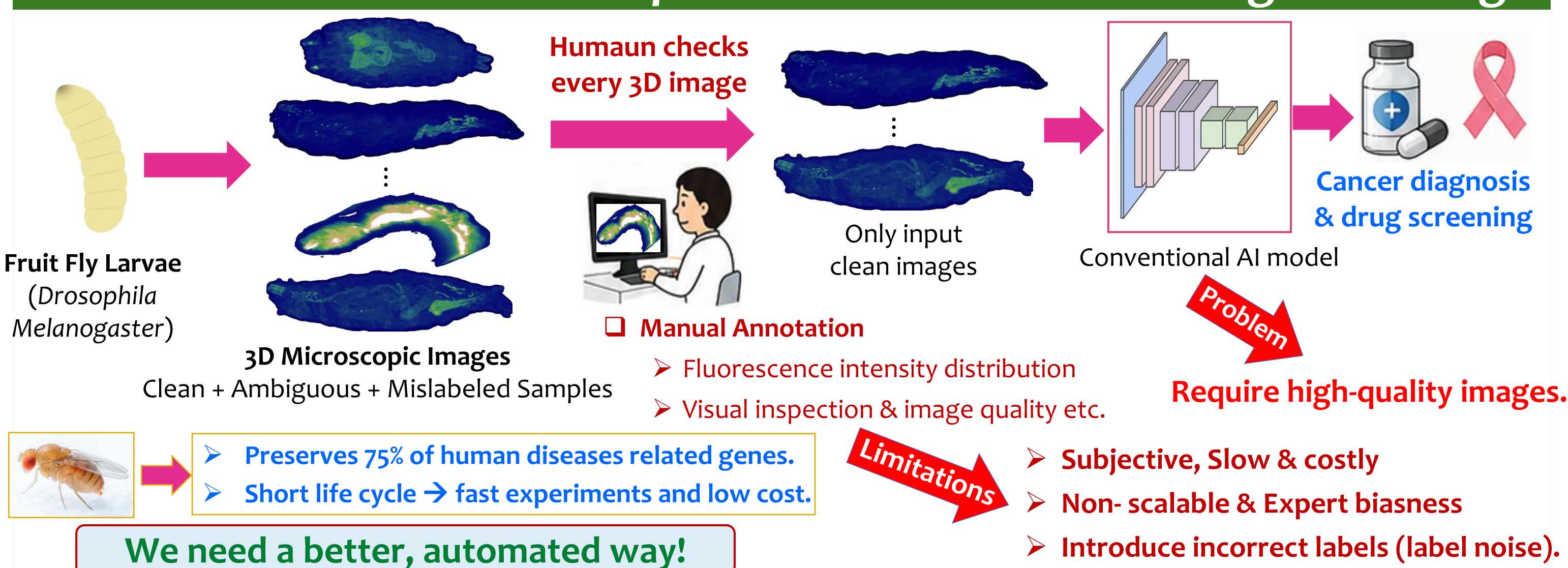


8 DECENT WORK AND ECONOMIC GROWTH

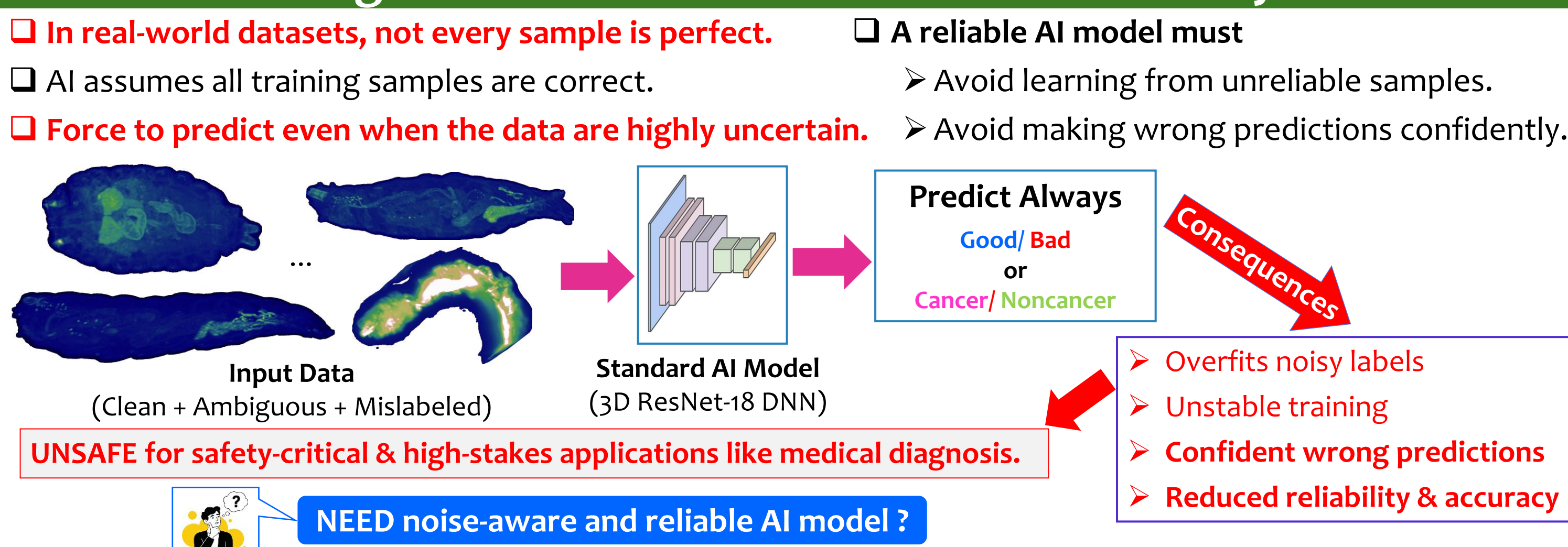


- ◆ AI refers to an expert or says, 'I don't know' for uncertain cases.
- ◆ Making AI decisions more accurate & trustworthy.
- ◆ Safer AI for healthcare & safety-critical applications.
- ◆ Directly supports the SDG 3 and SDG 9.

Our Current Process: *Drosophila*-Based Tumor and Drug Screening

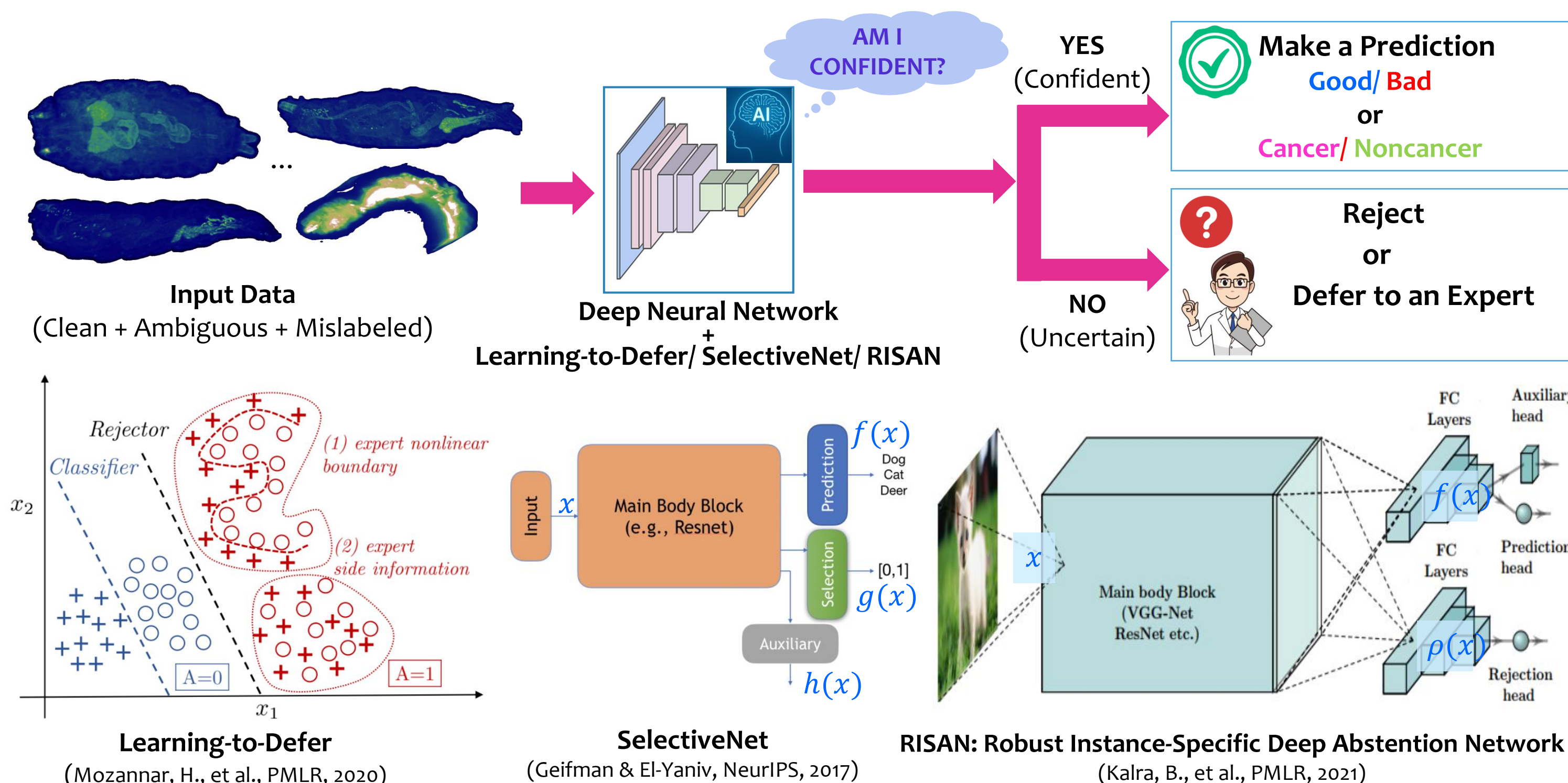


Challenges of Conventional AI Model with Noisy Data



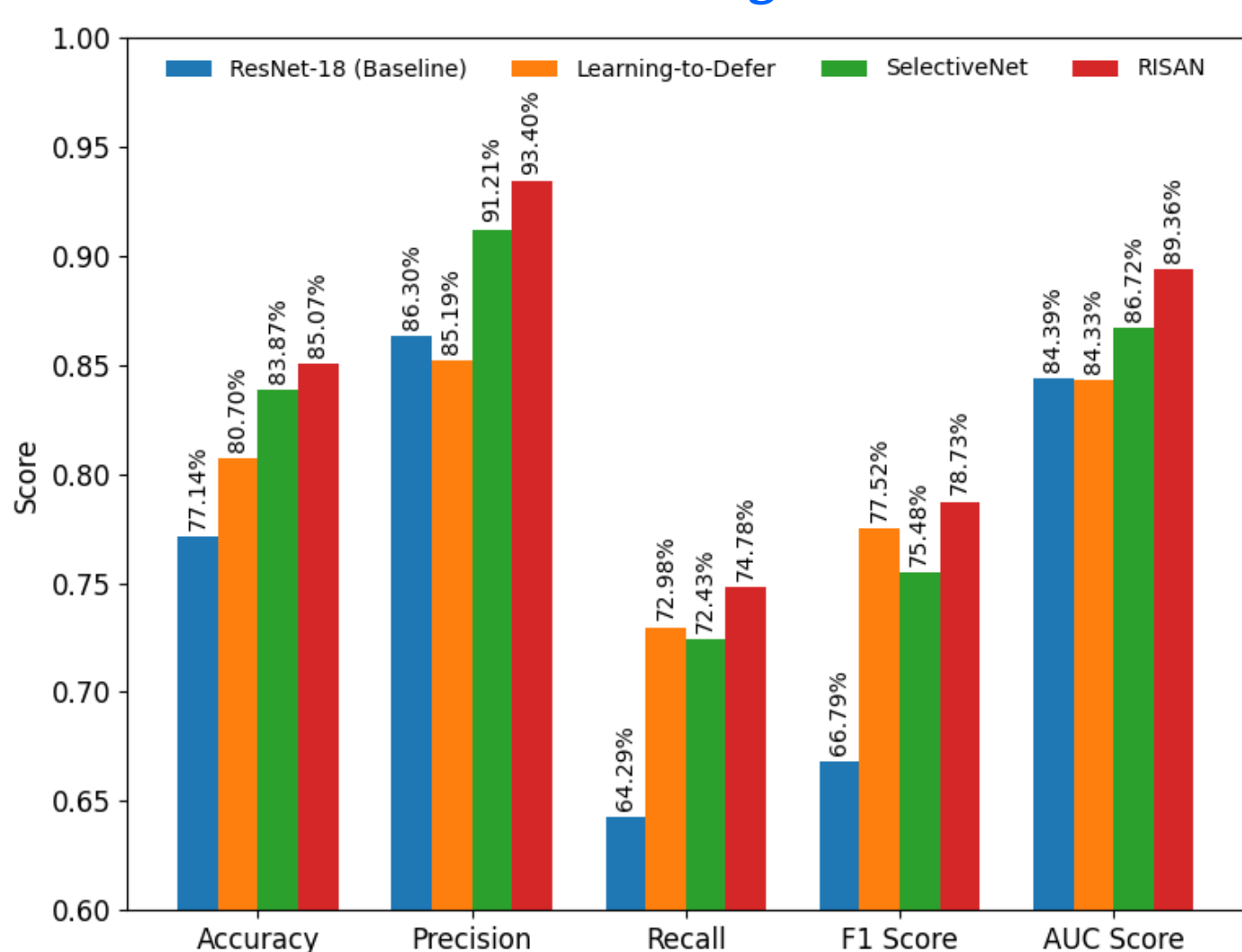
Solution: Teach the AI to Know Its Own Limitations

- Instead of forcing AI to answer every time, it first asks, "Am I confident" ?
- Do not treat every sample equally. Estimate reliability of each sample before making decisions.
- Robust learning : Avoid learning from noisy labels during training.
- Noise & uncertainty-aware prediction: Avoid making unreliable predictions during inference.



Performance Analysis and Application in Chemical Engineering

- Autonomous assessment of 3D fluorescence image quality in a pancreatic cancer larval fly model.
- Reduces manual intervention → Automate the current Tumor & Drug Screening Pipeline.
- Risk-aware decision making → Fewer false decisions → more reliable and accurate scientific discovery.



RISAN achieved highest robustness & noise-awareness

Reliable Single-Particle Detection and Tracking using Noise-Aware Deep Learning

