New Product Update

Lowering the barrier to Edge AI

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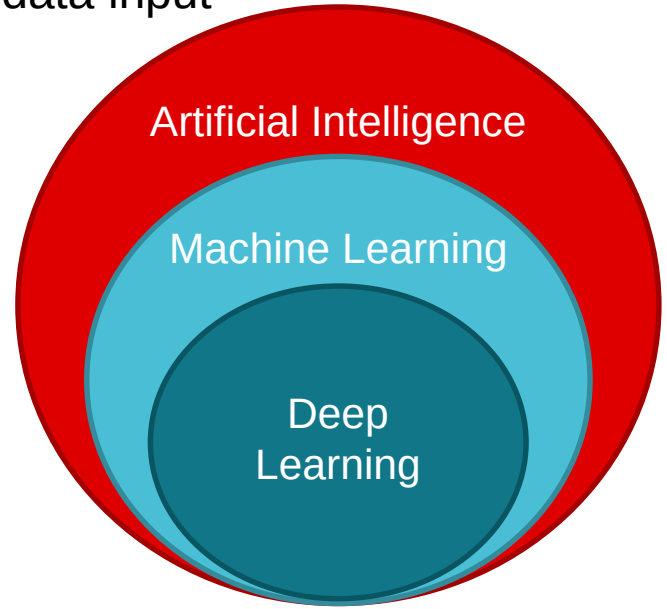
What is AI and deep learning?

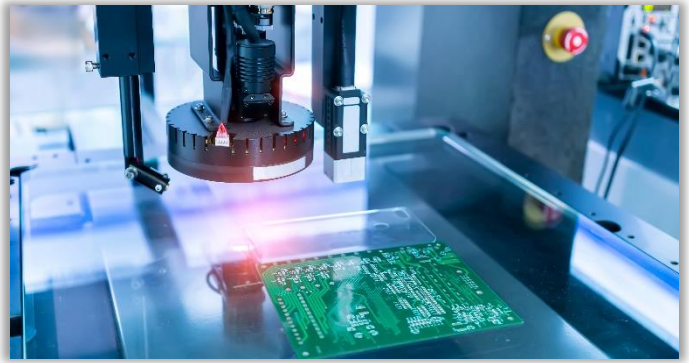
- Artificial intelligence (AI) – Using human-like intelligence to solve tasks
- Machine learning (ML) – Algorithm uses data to find patterns
- Deep learning (DL) – very large algorithm using raw data input
  - Usually needs lots of data!

- Machine learning provides significant advantages over classical computing
  - Scalability
  - Less R&D effort
  - More accurate.

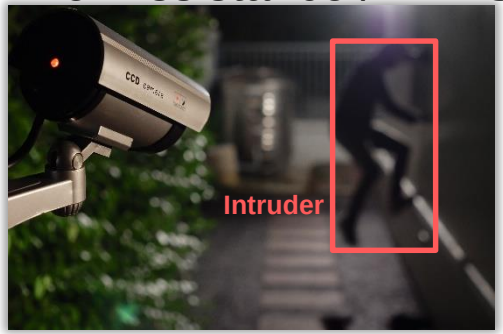


Where do we use AI?

Driver Assistance / ADAS



Machine Vision & Defect Detection



Security and Home Automation Cameras

Speech recognition, text analysis, translation

And Many More!

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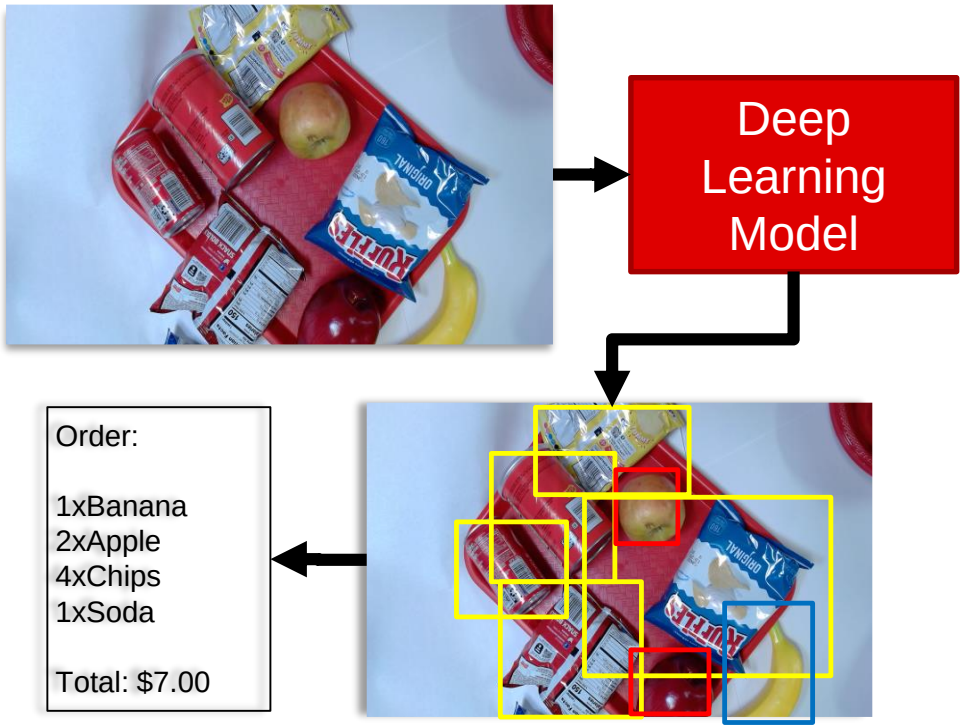
https://www.digitalhumans.com/blog/what-are-virtual-assistants

Example problem | Automating checkout scanner

- Task: recognize purchasable items
  - Fill in receipt
- Why use deep learning here?
  - Easier to implement
  - More accurate/robust
- Approach:
  - Collect data
  - Train a model offline
  - Move trained model to embedded platform for inference



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https://www.mercurynews.com/2019/03/25/will-aluminum-foil-keep-hungry-squirrels-from-precious-tomatoes/

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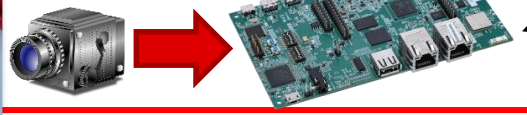
Why AI at the Edge?

- Edge AI – running AI where data is generated
  - Algorithms run on embedded processors or microcontrollers
- Benefits
  - Reduced latency
  - Privacy
  - No Cloud compute or network costs
  - Increasing support & performance from embedded vendors



Network

On Cloud

On Edge

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Barrier | Edge AI is new and intimidating

Seasoned Embedded Engineers:

- Divergence from traditional signal processing
- Topics/tools to learn are rapidly changing
- Errors in deep learning accuracy are difficult to diagnose

Data scientists and AI experts:

- Embedded is highly resource constrained and requires tradeoffs
- New tools for achieving optimal performance

Hobbyists and weekend warriors

- Need straightforward path to getting started (hardware & software)
- Rely on examples, familiar tools w/ community support

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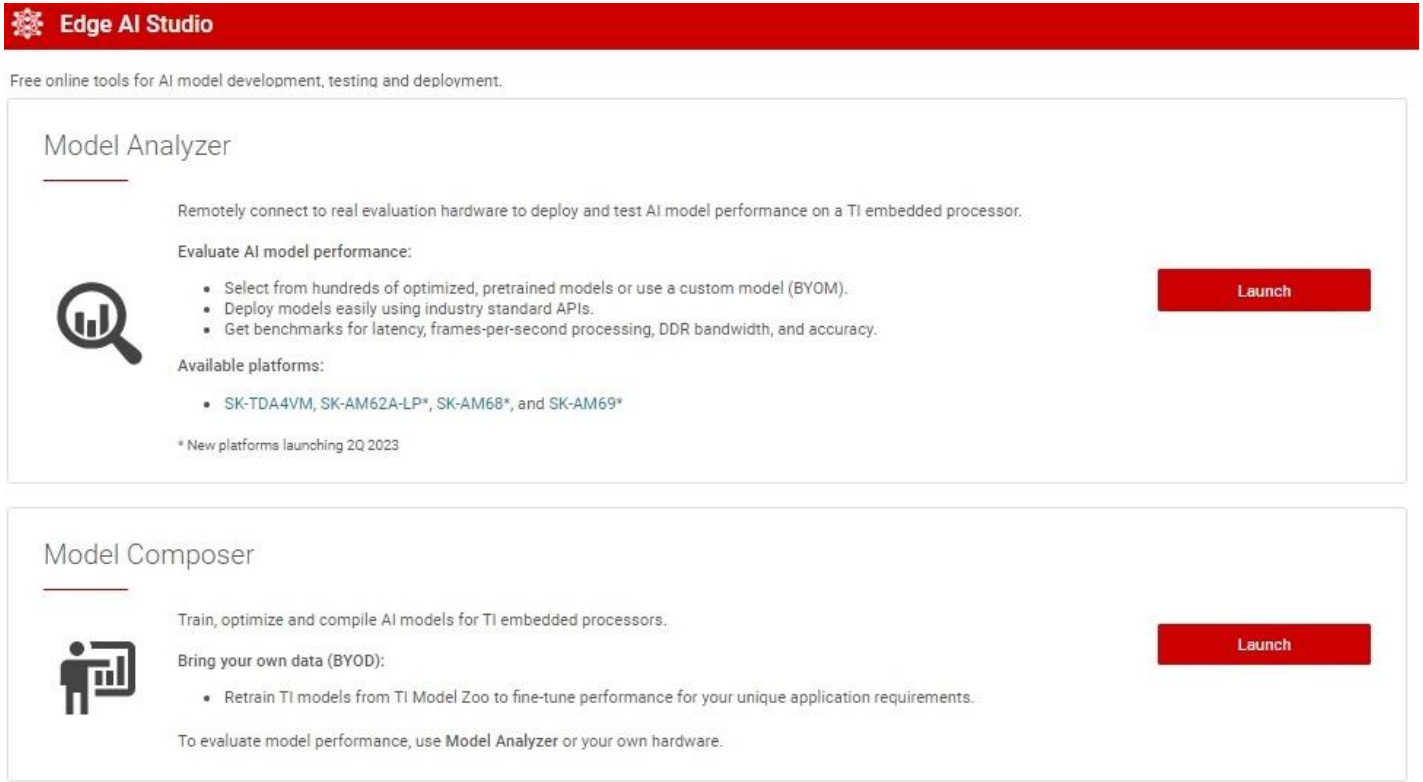
Introducing Edge AI Studio – AI Tool Hub



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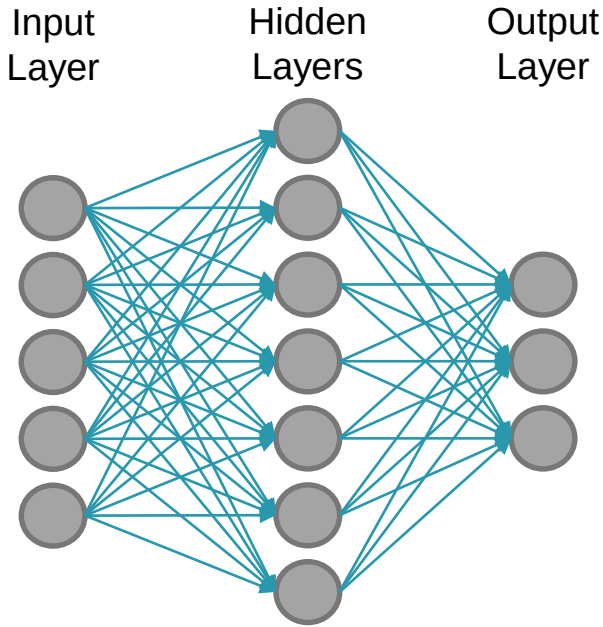
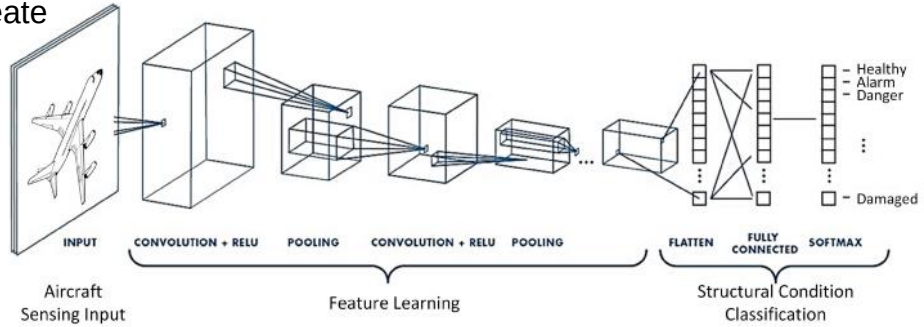
Deep learning and transfer learning

- Deep learning model
  - 10s/100s of layers, millions/billions of parameters
  - >>10k data samples to train from scratch

- Transfer Learning
  - Full model trained on large (1M+) data set
  - Retrain with a smaller dataset for a specific task
    - 50-100 samples for proof of concept
    - These can be synthetic!
      - Photo-editing to create training samples





https://medium.com/analytics-vidhya/introduction-to-convolutional-neural-network-6942c189a723

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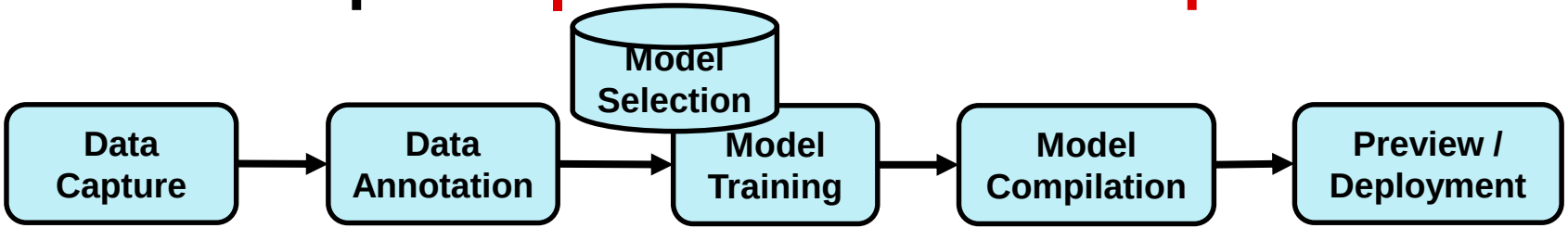
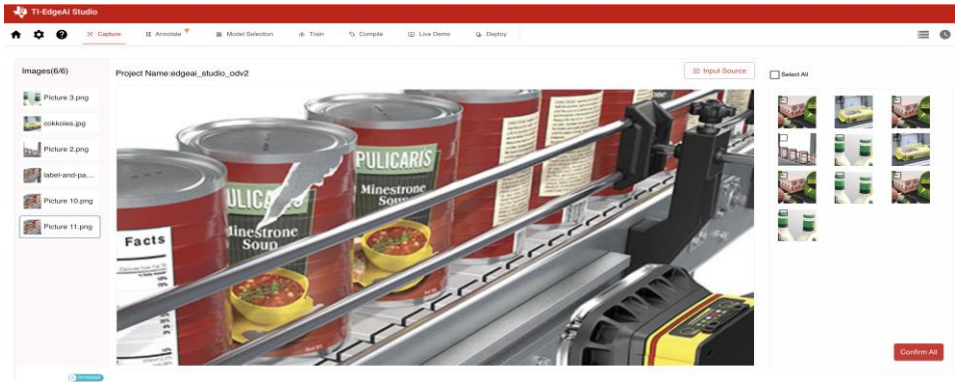
Model Composer | No Code AI Development





- Quick, Easy, End-to-End AI development environment in the cloud
- Transfer learning on state-of-the-art deep learning models like YOLO-X
- Targeted for Industrial applications: Machine vision, factory/warehouse automation, agriculture, …

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Let’s look at Model Composer!

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Build your own model with Edge AI Studio!

https://www.ti.com/edgeai

- Pick a problem to solve with vision AI and build proof of concept
  - Recognize a dog is on the couch
  - Birds on a tree/bush/garden
  - Your boss is near your desk
- Take 20-30 pictures and load into Model Composer
  - Use a classification model
- Train and compile a model
- Run live inference to see how it performs

Next steps:

- Get an EVM for an Am6xA Edge AI SoC
- Go beyond proof of concept

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Visit www.ti.com/npu

For more information on the New Product Update series, calendar and archived recordings

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