Edge ML Possibilities

LivingProject: Demonstrate ML/DL at the edge.

Rationale: Gartner says by 2025 80% of manufactured devices will be doing self-analytics. This implies there will be billions of devices doing ML at the edge. 30 billion microcontroller-powered devices produced each year.  we can boost the intelligence of billions of devices that we use in our lives, without relying on expensive hardware or reliable internet connections. Imagine smart appliances that can adapt to your daily routine, intelligent industrial sensors that understand the difference between problems and normal operation, and magical toys that can help kids learn in fun and delightful ways.

We haven’t thought of the second+ order derivatives.

1. Wearables – Gartner: 40% workers by 2023
2. Medical monitoring
3. Home/building sensors
4. Self driving automobiles
5. Smart cameras
6. Toys
7. Prosthetics
8. Agriculture monitoring
9. Paper Jan 8, 2020 - Convolutional-Recurrent Neural Networks on Low-Power Wearable Platforms for Cardiac Arrhythmia Detection
10. Hearing Aids
11. Hearing Mufflers
12. Gestures
13. Space Exploration
14. Voice recognition
15. Object recognition
16. Object tracking
17. Eye Gaze tracking

Do a book as well?

* Edge AI
* What about ML/AI for mobile/RPi?
* EA?
  + M&A
  + Reduce redundancy

What can we do for a live project?

* Pandas in Action? – Apply to data prep for ML and DL - MEAP
* Machine Learning with Tensorflow 2nd Ed – Numpy - MEAP
  + Focus on data prep.
  + Finish of with DL from book
* Set of skills
* What we want them to do
* Wrap with scenario
* Docs? Starting docs? Templates
* Proj 4-6 hours deliver and compare
* Create shorter projects
* Sell as series 4-5 proj
* EA WOULD WORK
  + Business objectives – scenario(s) and use cases
  + Operations/Process doc –
  + Systems & Data
  + Technology
  + Roadmap - how to get to the end state
* Create proposal
* Review by volunteers
* Goes to publisher for approval
* Go to contract
* Advance and royalty model
* 1k advance and 1% royalty
* Outlines deliverables
* 3 months to deliver
  + Write text 1 month
  + Get ref materials
  + Stand up 2 month – beta testors
  + Be proj mentor
  + 1 hr 1 per week
  + Make FAQ from questions
  + 3 month clean up
  + Certification questions
  + 30 some hours over 3 months
* Template form
* Example
* Simple dexcribe what doing
* Give a taste of scenario – what companies involved what they do
* Learner s role – what they do
* Walk through steps
* Pt 3 what do they need to know to get started
* What skills will they gain?
* List of apps used
* Short note on what each does
* Pt 4 break down of individual projects
* Drop milestone
* Specific actions per project
* What is the final deliverable
* Each has own github repo
* Pt 5 – Link to won books or list of books or where you would send eople to learn where they would do things
* Pt 6 Competing products
* Strengths and limitations

The stack:

* **tinyML Applications and Usecases**
* **tinyML algorithms machine learning algorithms and optimizations**
* **tinyML frameworks, tools, and techniques**
* **Ultra-low-power system design**

Starting to get models we just load

Tools

TF Lite for Micros first demonstrated in March 2019

Hardware

Arduino Nano 33 BLE Sensor- $34

Arduino Portentia Vision Shield - $48

Adafruit EdgeBadge - $45

Sparkfun OpenMV Cam H7 - $65

Sparkfun OpenMV Cam H7 Plus - $80

Sparkfun Edge - $15

Rasberry PI?? – Not Micro

Google Coral - $60.00

NVIDIA Jetson NANO - $99

Intel Movidius and OpenVINO

Intel Neural Compute Stick 2 - $70

#TFDevSummit

Live Projects

Detecting Deepfakes with OpenCV and SVM

# 3D Medical Image Analysis with PyTorch

# Human Pose Estimation with Deep Neural Network

# Art Style Transfer Using Neural Networks