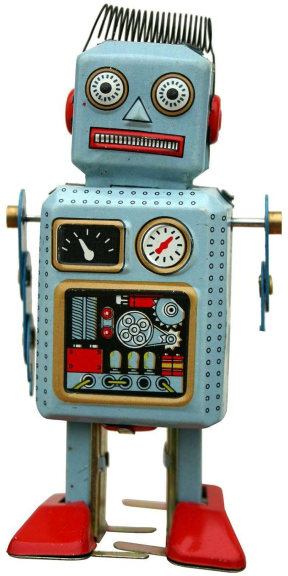
Computer Vision!

What is Computer Vision?

What is Computer Vision?
It’s How AI processes Visual Inputs

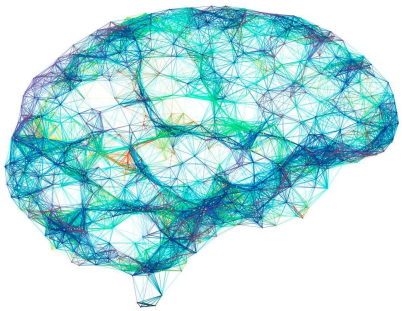
How Computer Vision works

- How do Machines See?



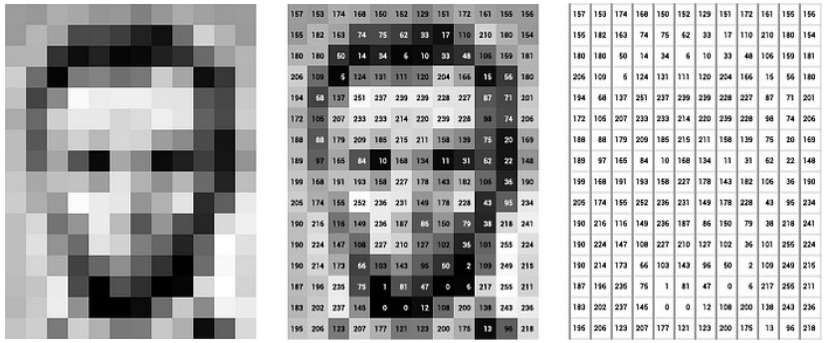
Neural Networks is how Computers

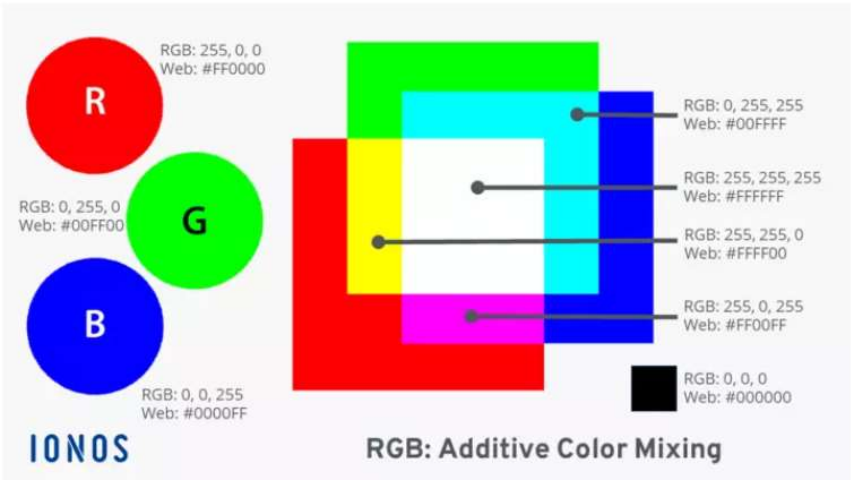
- Neural Networks
- Neural Networks love numeric only data
- Capable of taking an extremely high amount of input features, and labels, and Predicting
- How do we convert images to numbers?



Converting Images to Numbers

- Images are comprised of pixels
- Colors of the Rainbow can be represented numerically
- Black and White is just 1 number (Magnitude or Intensity)
- 3 Numbers for Color by mixing RGB in varying Magnitudes





Feature Extraction

- Convolutions are applied to the image to extract Features

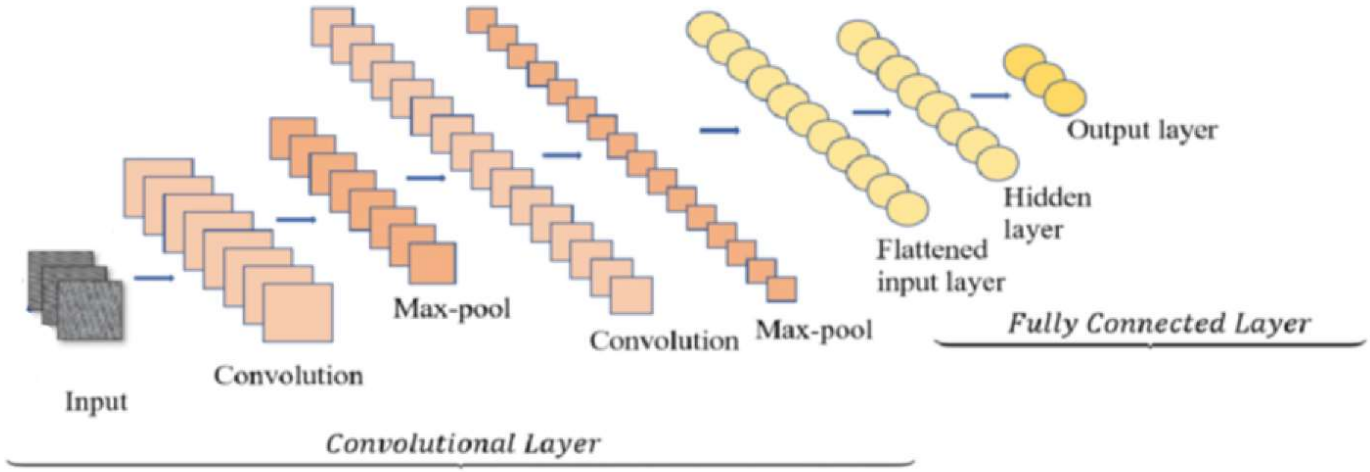
- https://youtu.be/KuXjwB4LzSA?si=XDEXIyIgbh2nxWYj
- https://www.youtube.com/shorts/4xWpQe3G9qI
- 3Blue1Brown, the resource for breaking down confusing ideas

- https://www.thinkwithgoogle.com/marketing-strategies/automation/applied-machine-learning/
- https://youtu.be/wMdX2Hy5XN8?si=noqH5Vsg3Ya01ShP

- Maybe understanding the Convolutions is not necessary for a lot of Deep Learning Scientists/Researchers interested in Language.

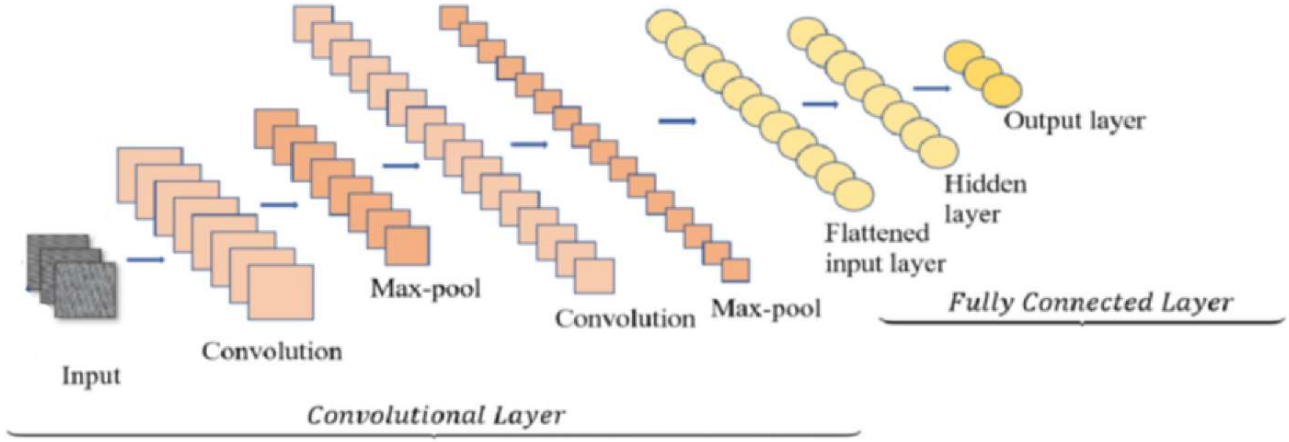
2D Convolutional Neural Network?

- 2D because images are 2D
- Convolutional because we apply Convolution Layers



2D Convolutional Neural Network?

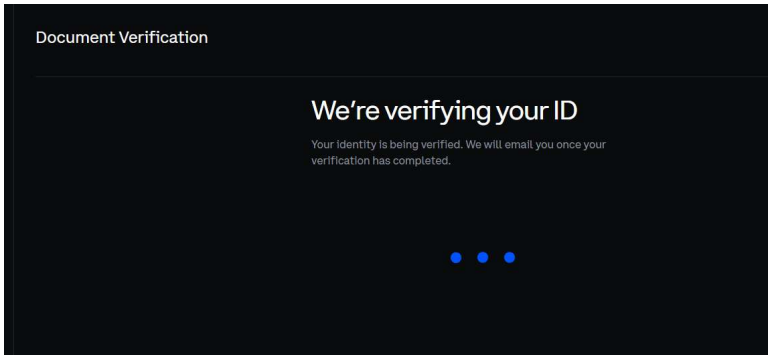
- Max-pool because we need to reduce dimensions after Convolution
- Activation Function, Output Layer because we have desired Output

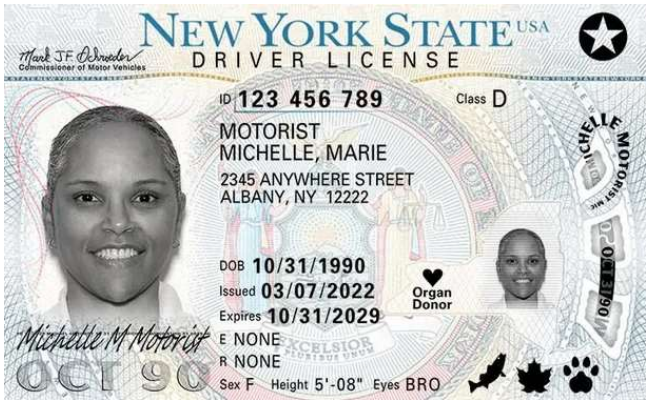


How can Computer Vision be used with Crypto?

Fraud Prevention

- Already in use verifying identity, documents



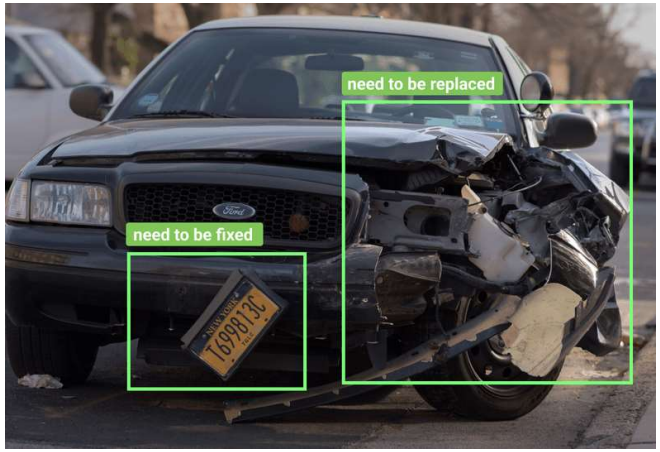


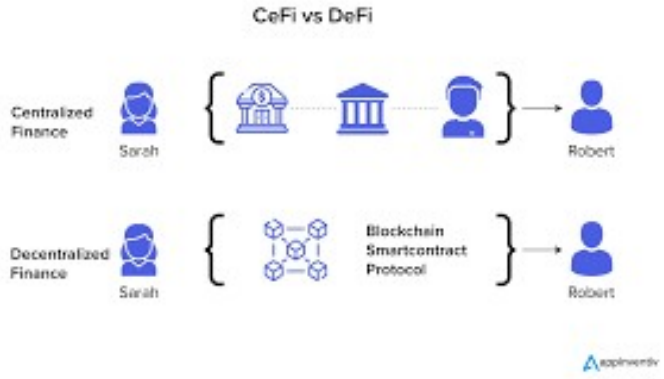
Food Traceability

- Did a delivery show up? Is food spoiled? Broken Seal?

Insurance

- Decentralized insurance would pay out upon receipt of video/images proof





Healthcare

- Image based verification can lead to better aid distribution using smart contracts

Nature Conservation and Advocation

Photos can be associated with environmental resources by Geolocation

This data along with other sensor data, can be managed on public blockchain




Nature Conservation and Advocation

Provides a crowd-source verifiable fact of possible environmental quality

All interested parties could contribute information: Farmers, Environmentalists, Outdoor Recreationalists, even Augmented Reality Enthusiasts




How can Cryptocurrency help Computer Vision?

- **Data security:** helping to store data in a tamper-proof and immutable manner, with high availability using decentralized servers that are less susceptible to attack, manipulation, censorship and denial of service.
- **Data provenance, traceability, auditability**: recording transactions and assets in an immutable and transparent manner, facilitating tracking of the origin, ownership, provenance of data and agreements with digital signatures and time-stamping. This also provides an auditable and verifiable trail.

How can Cryptocurrency help Computer Vision?

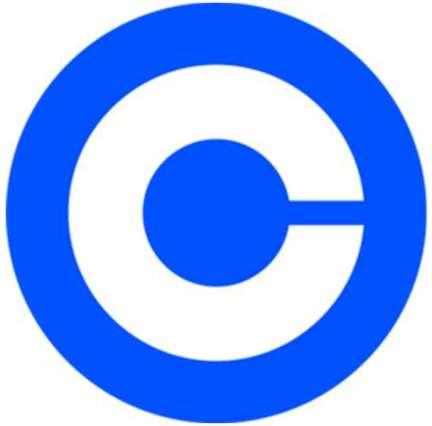
- **2.1. Data and model integrity:** Blockchain can be used to develop solutions that help users and developers ensure that the data and models have not been modified without their knowledge. For example, an API-based service could allow data-owners and AI developers to record time-stamped hashes of datasets and models to ensure their integrity and log the entire process of model development and the datasets used to track the entire lifecycle, in a way that could be made available to third party auditors or regulators. The system could even be directly integrated into ML development tools such as Pytorch, or Tensorflow.Keras.

  This could help improve the integrity and trustworthiness of models, by making their development process more transparent and secure. It may also be possible to log relevant proofs of the “unlearning” of particular data from models onchain to demonstrate to the satisfaction of regulators that a certain provider's data have been removed from a given model. Logging hashes for data and model outputs onchain can also help to combat deep fakes - for example, applications may be able to ensure the authenticity of the data used by checking digital signatures associated with the source of the data onchain, or a decentralized version of “Snopes.com” could be designed and implemented onchain to flag deep fakes.

How can Cryptocurrency help Computer Vision?

2.2. Data and model usage and access rights management: A non-fungible token can demonstrate one's ownership of any given digital content or data. Depending on the use case the content in question could be a model input, such as a prompt to a Generative AI tool, it could be data used to train a model, it could be parameters of a model, or it could be the output of a model. The NFT would allow the user or developer to assert their ownership and further to transfer ownership of the corresponding digital asset to another. It is also possible to envision a blockchain-based access control mechanism for data and models, for example, a smart contract to allow/limit access based on a given list of user addresses. Or it could be integrated with a decentralized identity solution (possibly using state of the art cryptographic techniques such as zero-knowledge proofs) to allow access based on certain demonstrated attributes (e.g. allowing access based on demonstrating the user is old enough, or only from certain geographical locations) while preserving the privacy of the user.

Special Thanks to



- Rajarshi Gupta and Vijay Dialani
- https://www.coinbase.com/blog/blockchain-for-ai

Let’s go to the Python Code!

Thanks for Watching!