

X Ray Dawgz

XRD analysis by CNN

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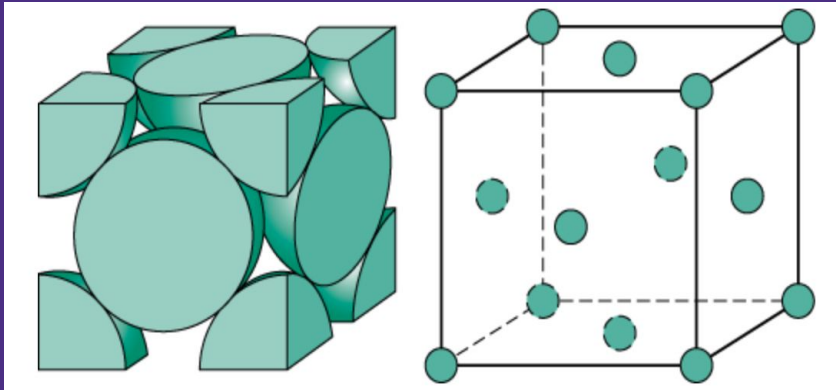


Background

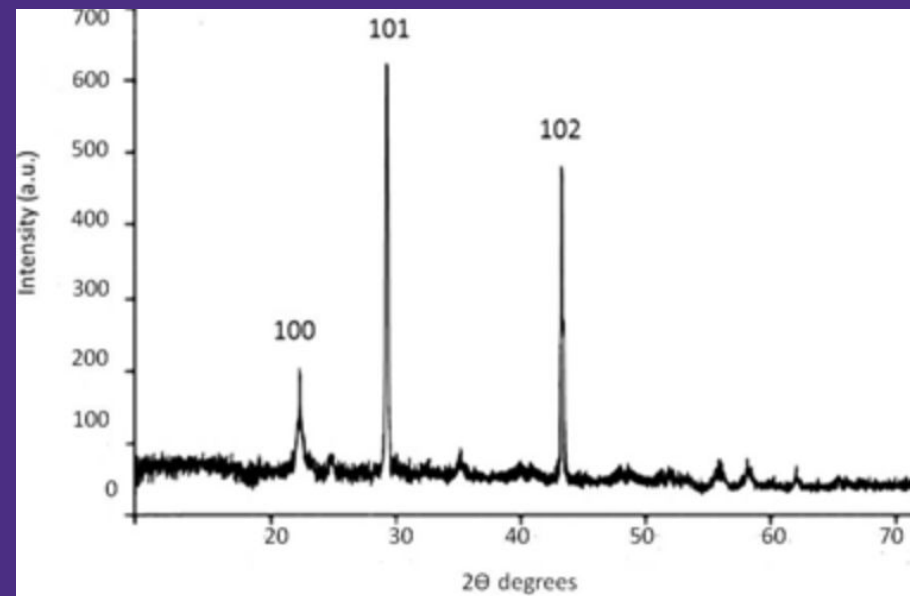
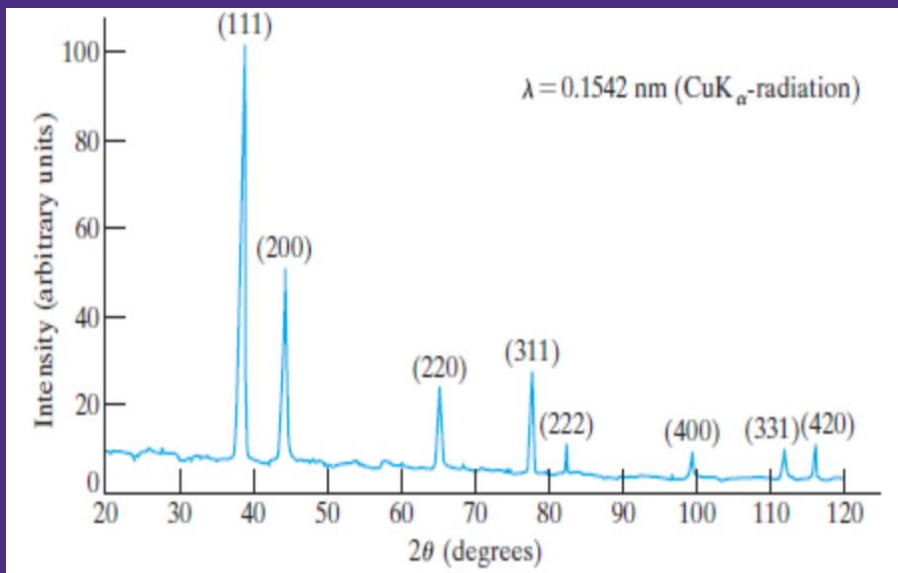
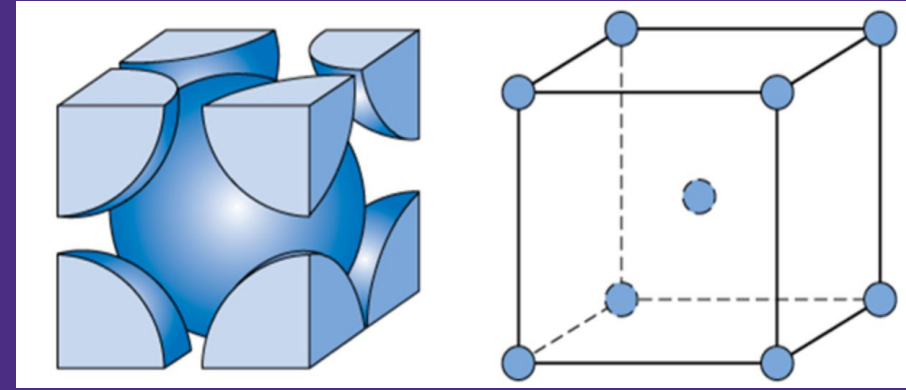
It is different from the BCC images and FCC images on XRD, so we would like to use the system to categorize them.

Bragg's law : $2d\sin\theta = n\lambda$
we would choose the same $\lambda(\text{Cu-}\alpha)$ for our system

FCC (face-centered cubic)



BCC (base-centered cubic)



Technology Considered

Model: CNN Convolutional neural network
Using Keras instead of MXnet, Caffe, Theano

Preprocessing: Scikit-learn, statistic

Data: From paper studying on synthesizing metal nano-particles, ex Ag, Au, Cu

Application: Characterize unknown metal material from XRD image

Summary of project

XRD data (7 elements x 5 images = 35)

CNN model

Identify crystal type : FCC, BCC and HCP

Drawbacks of Keras

- > “Frontend” framework
- > Not easy to change training detail (ex: penalty)
- > Lacks some predefined trained model to use
- > Sometimes hard to debug

Appeal of Keras

- > Offers consistent & simple APIs
- > Easier to learn and use
- > Enables fast experimentation and prototyping
 - Quickly able to try out different configurations of our model
- > Allows usage of TensorFlow backend without actually “learning” it
 - Use Keras as a module of Tensorflow to combine the advantages of each of them

Thank you!

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