Theory

Topic	By	Duration	Notes	Link
Perceptrons, xor and the resurgence of Neural Networks	Christopher Bishop	1 hour	Not necessary to understand neural networks but recommended	https://www.youtube.com/watch?v=8FHBh_OmdsM
Introduction to Neural Networks	Grant Sanderson/3Blue1Brown	20 minutes	Assumes no background so it can be slow at times	https://www.youtube.com/watch?v=aircAruvnKk
Gradient Descent	Andrew Ng	10 minutes	Explanation starts with linear regression but is generic	https://www.youtube.com/watch?v=yFPLyDwVifc
Backpropagation	Geoffrey Hinton	10 minutes	The intuition and the key idea of the algorithm	https://www.youtube.com/watch?v=LOc_y67AzCA
Backpropagation	Victor Lavrenko	5 minutes	The actual algorithm	https://www.youtube.com/watch?v=An5z8lR8asY
Reference for the algorithm	Brilliant.org	-	All the required math and sample code in python	https://brilliant.org/wiki/backpropagation/
How neural networks work	Károly Zsolnai-Fehér/ Two Minute Papers	5 minutes	Talks about how adding layers gives better decision boundaries	https://www.youtube.com/watch?v=He4t7Zekob0
Introduction to Convolutional Neural Network	Mike Pound/Computerphile	15 minutes	Connects the idea of image filtering with neural networks	https://www.youtube.com/watch?v=py5byOOHZM8
Understanding Convolutions	Chris Olah	-	This starts with the intuition behind convolutions and then relates it to CNNs	http://colah.github.io/posts/2014-07-Understanding-Convolutions/

Practical Considerations

Topic	By	Duration	Notes	Link
How CNNs work	Brandon Rohrer	25 minutes	Discusses "tricks" used to make CNNs work	http://brohrer.github.io/how_convolutional_neural_networks_work.html
Convolution Visualizer	Edward Z. Yang	-	Visualizes how various padding, stride etc. affect shapes and dependencies between the input and output	https://ezyang.github.io/convolution-visualizer/index.html
The Building Blocks of Interpretability	Chris Olah	-	What do Convolutional Neural Networks learn ?	https://distill.pub/2018/building-blocks/
Exploring Neural Networks with Activation Atlases	Shan Carter, Zan Armstrong, Ludwig Schubert, Ian Johnson, Chris Olah	-	Similar to the one above but shows a global view of the network of focusing on a single image.	https://distill.pub/2019/activation-atlas/

References & additional reading

CS231n: CNNs for Visual Recognition	Fei-Fei Li	1 hour x 16 lectures	This is a Stanford course with all material available.	http://cs231n.stanford.edu/
Deep Learning	Ian Goodfellow, Yoshua Bengio, Aaron Courville	-	Chapters 9, 11, 12 cover CNNs, practical considerations and applications	https://www.deeplearningbook.org/
What is wrong with CNNs ?	Geoffrey Hinton	1 Hour	Limitations of convolutional neural networks	https://www.youtube.com/watch?v=rTawFwUvnLE

Implementation

Topic	By	Duration	Notes	Link
Neural Networks	Stephen Welch/Welch Labs	5 minutes x 7 videos	This playlist covers implementation of a neural network in (almost) pure python	https://www.youtube.com/watch?v=bxe2T-V8XRs&list=PLiaHhY2iBX9hdHaRr6b7XevZtgZRa1PoU
Deep Learning using keras	Yufeng Guo	10 Minutes		https://www.youtube.com/watch?v=J6Ok8p463C4
CNN using keras	Keras-Team	-	This is a piece of example code that trains a CNN to recognize digits using the keras library.	https://github.com/keras-team/keras/blob/master/examples/mnist_cnn.py
TensorFlow, Deep Learning, and Modern Convolutional Neural Nets, Without a PhD	Martin Görner	1 Hour	Tutorial on implementing modern neural net architectures in tensorflow	https://www.youtube.com/watch?v=KC4201o83W0
Classifying digits using a neural network in tensorflow	Martin Görner	2 Hours		https://codelabs.developers.google.com/codelabs/cloud-tensorflow-mnist/
Tensorflow Roadmap	Amirsina Torfi	-	An organized list of resources and tutorials on tensorflow.	https://github.com/astorfi/TensorFlow-Roadmap
Deep Learning on IU's Big Red II	Sumit Gupta	-		http://sumitg.com/2016/03/23/caffe-big-red-ii/ https://kb.iu.edu/d/aoqh