Understanding the history of pre-trained models

LeNet-5

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- Proposed in 1998

Gradient-Based Learning Applied to Document Recognition

Yann LeCun, Léon Bottou, Yoshua Bengio, and Patrick Haffner

Abstract—

Multilayer Neural Networks trained with the backpropagation algorithm constitute the best example of a successful Gradient-Based Learning technique. Given an appropriate network architecture, Gradient-Based Learning algorithms can be used to synthesize a complex decision surface that can classify high-dimensional patterns such as handwritten characters, with minimal preprocessing. This paper reviews various methods applied to handwritten character recognition and compares them on a standard handwritten digit recognition task. Convolutional Neural Networks, that are specifically designed to deal with the variability of 2D shapes, are

I. Introduction

Over the last several years, machine learning techniques, particularly when applied to neural networks, have played an increasingly important role in the design of pattern recognition systems. In fact, it could be argued that the availability of learning techniques has been a crucial factor in the recent success of pattern recognition applications such as continuous speech recognition and handwriting recognition.

LeNet-5

- Proposed in 1998

- Handwritten and Machine-printed character recognition

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- Handwritten and Machine-printed character recognition
- Simple and straightforward architecture

Architecture: LeNet-5

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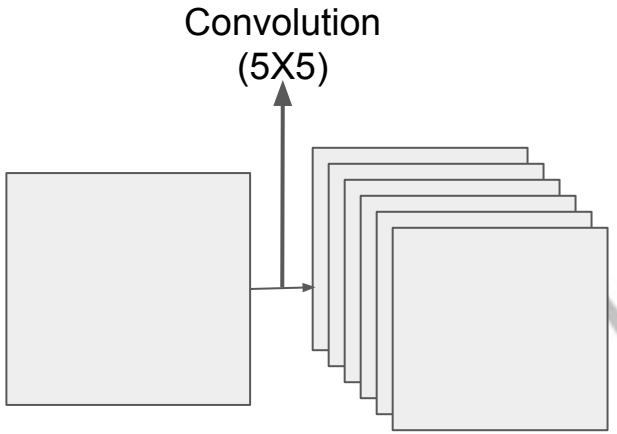
  - Softmax classifier

Architecture: LeNet-5

Input
32 X 32 X 1

Architecture: LeNet-5

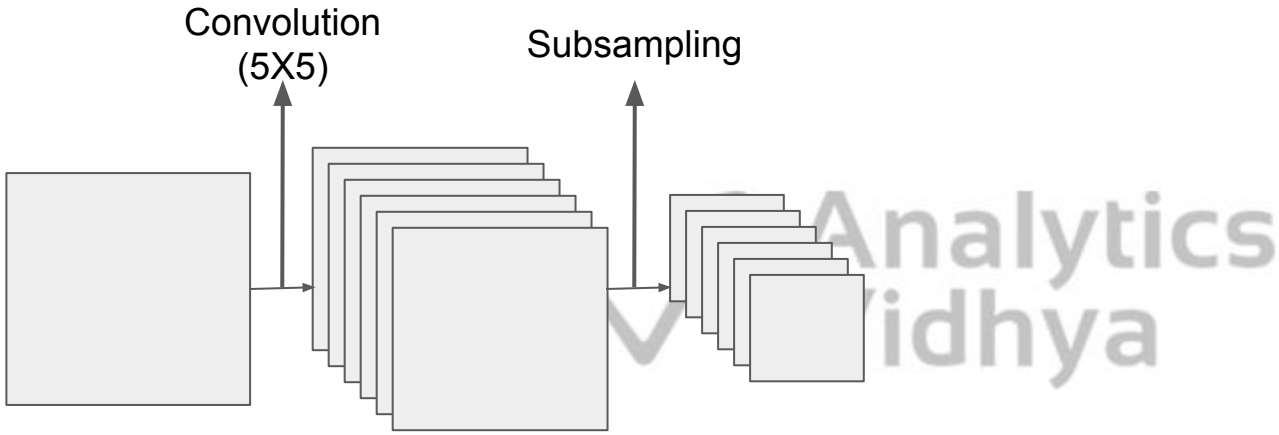


Output shape = ((32-5+1) X (32-5+1) X 6)
= (28 X 28 X 6)

Input
32 X 32 X 1

Feature Map
28 X 28 X 6

Architecture: LeNet-5



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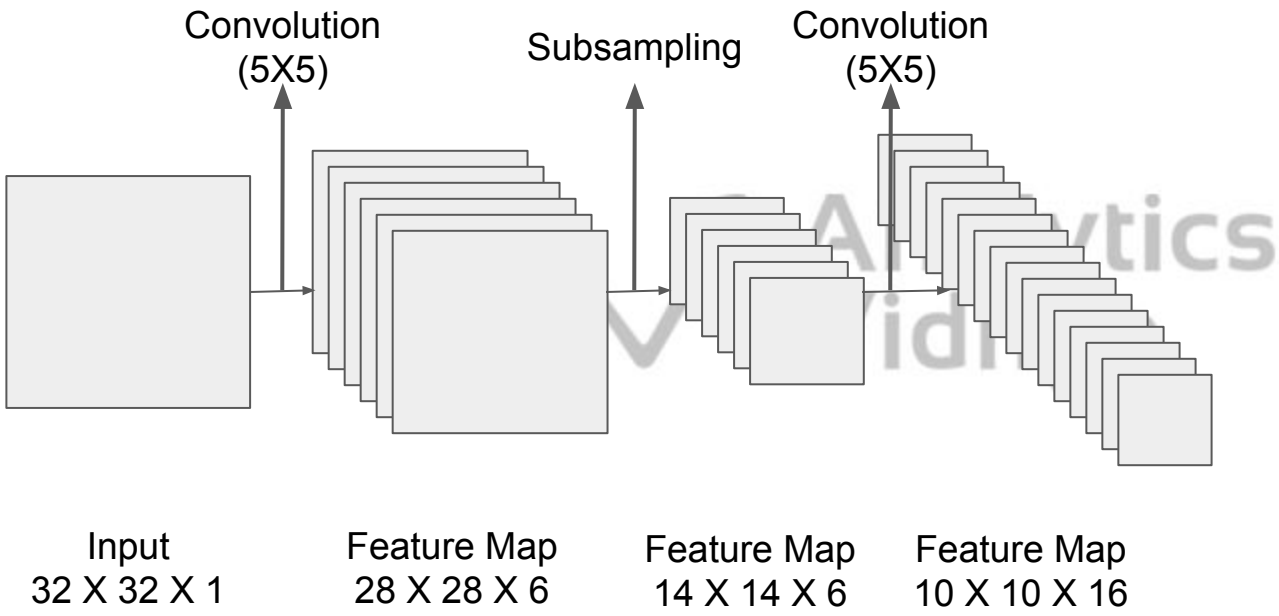

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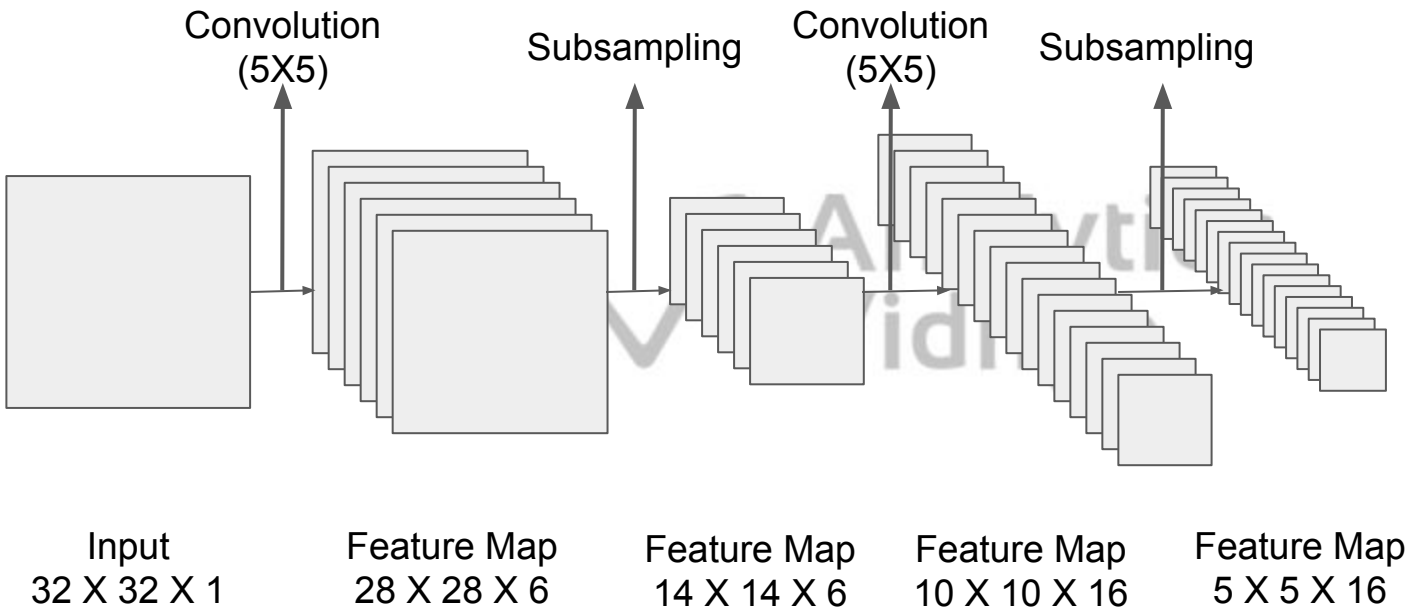

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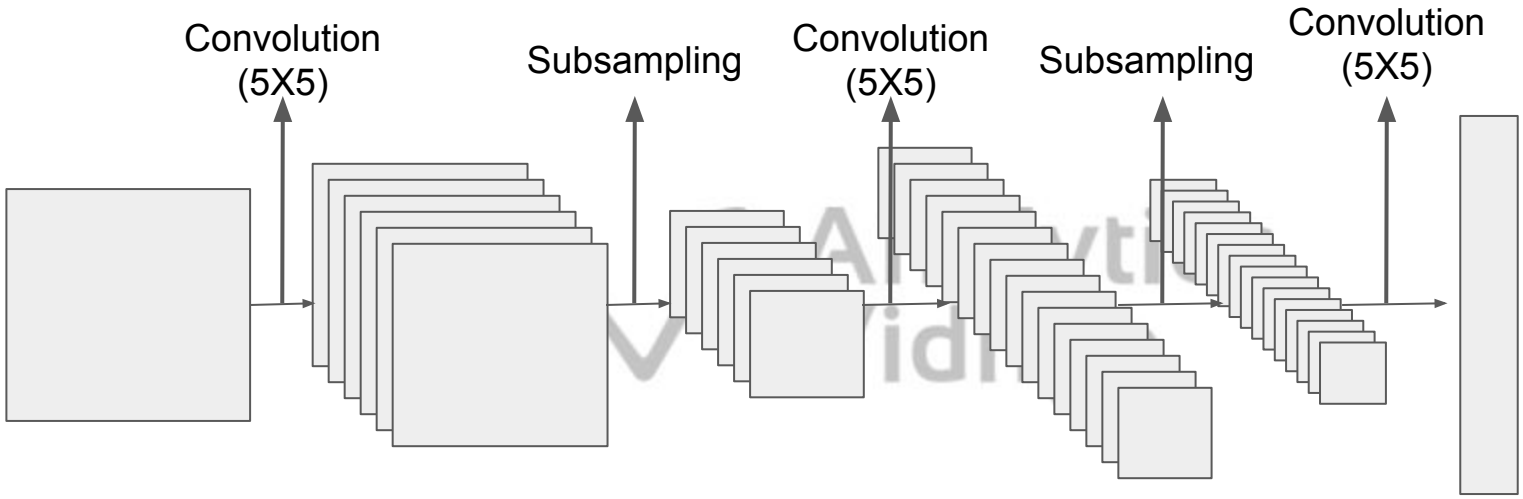

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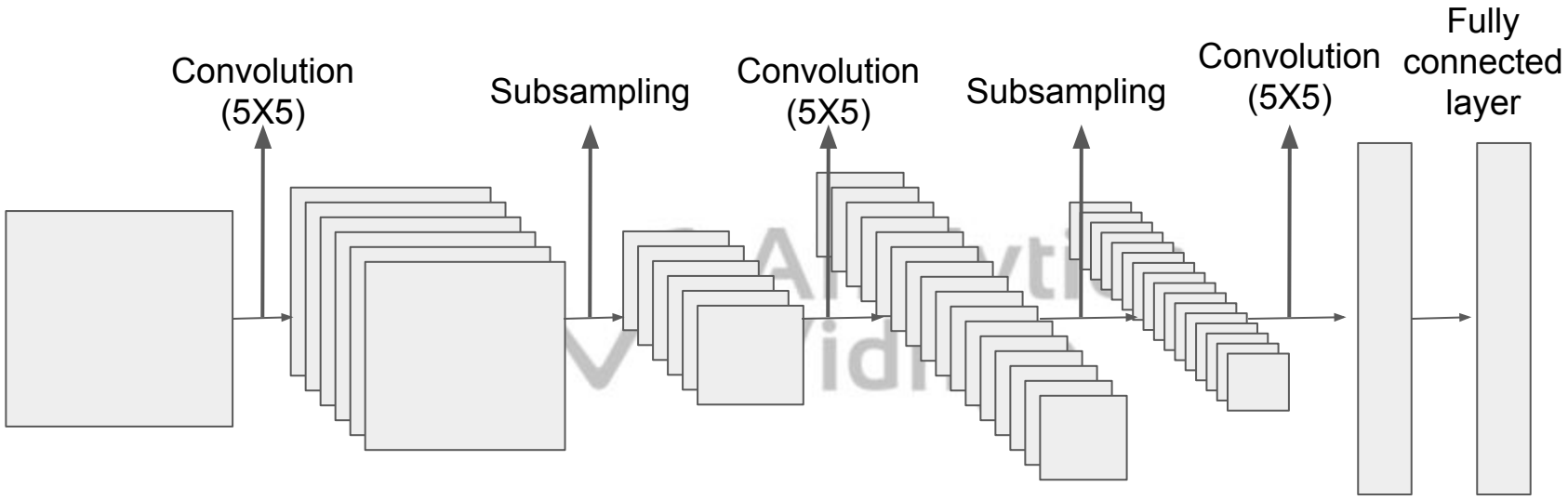

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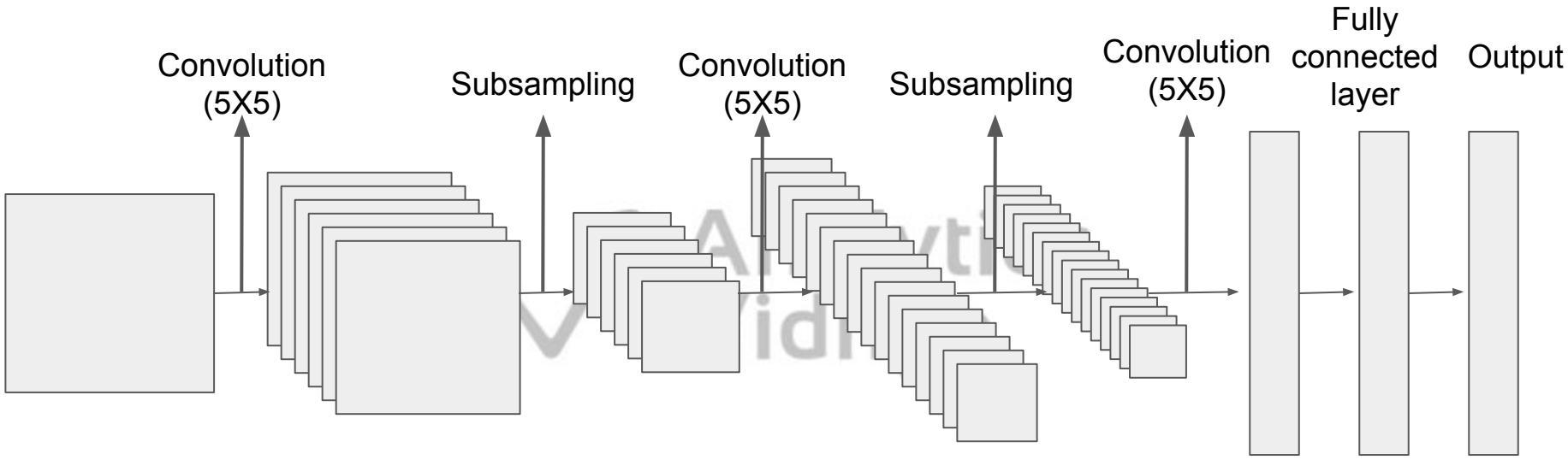

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Layer	# filters / neurons	Filter size	Stride	Size of feature map	Activation function

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Conv 1	6	5 * 5	1	28 X 28 X 6	tanh

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Avg. pooling 1		2 * 2	2	14 X 14 X 6	
Conv 2	16	5 * 5	1	10 X 10 X 16	tanh
Avg. pooling 2		2 * 2	2	5 X 5 X 16	
Conv 3	120	5 * 5	1	120	tanh

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Conv 1	6	5 * 5	1	28 X 28 X 6	tanh
Avg. pooling 1		2 * 2	2	14 X 14 X 6	
Conv 2	16	5 * 5	1	10 X 10 X 16	tanh
Avg. pooling 2		2 * 2	2	5 X 5 X 16	
Conv 3	120	5 * 5	1	120	tanh
Fully Connected 1	-	-	-	84	tanh

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Fully Connected 1	-	-	-	84	tanh
Fully Connected 2	-	-	-	10	Softmax

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Number of Parameters = 60k

Summary: LeNet - 5

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Analytics Vidhya

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Thank You

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