



History of Deep Learning

From E6691 Lecture Notes

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History of Object Recognition

~300 BC: In myth, the automaton Talos protects Crete.



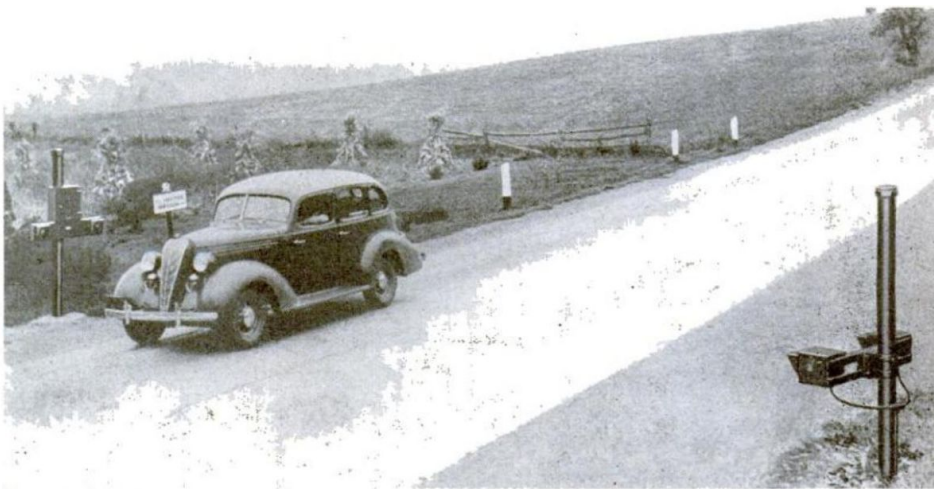
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AUTOS ARE COUNTED BY ELECTRIC EYES

VEHICLES passing a given point are automatically counted by a new traffic-recording device just introduced. Two infra-red lamps, housed a short distance apart and mounted on one side of a road, cast invisible beams across the highway to a photo-electric receiving unit on the other side. Interruption of the two beams by an auto actuates an electrical counting device, which can be set to total the number of passing vehicles by the hour, day, week, or month. Pedestrians are not counted, since the apparatus is so constructed that it registers only when both beams are blocked at the same instant.



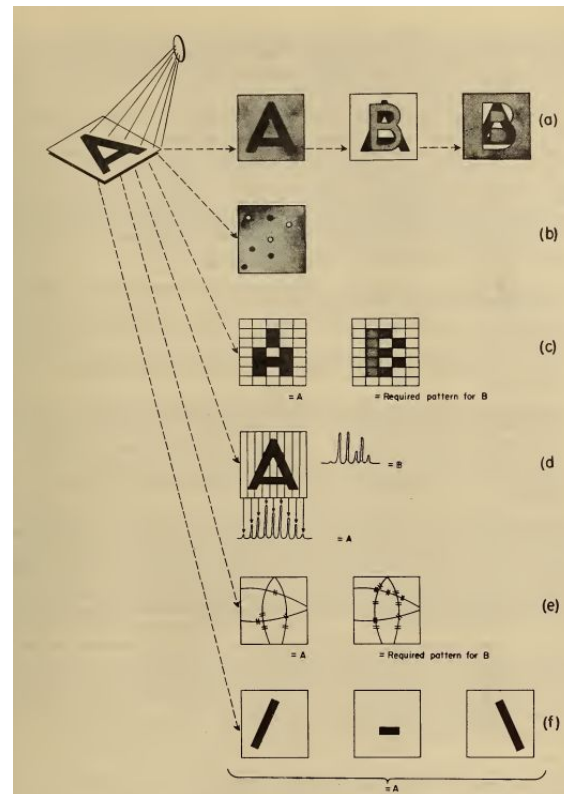
Passing vehicles intercept parallel beams of light and are counted by a photo-electric recording device

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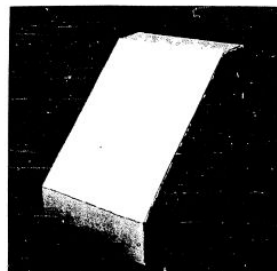
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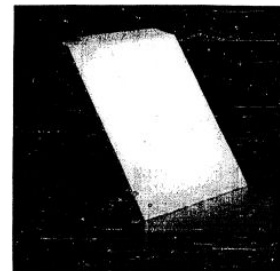
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1963: Roberts' PhD thesis considers the task of 3D shape recognition from 2D images.



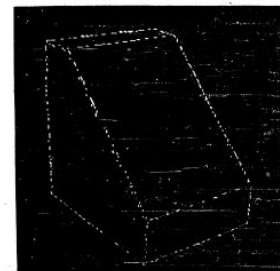
A. Original Picture



B. Computer Display of Picture
(Reflected by mistake)



C. Differentiated Picture



D. Feature Points Selected

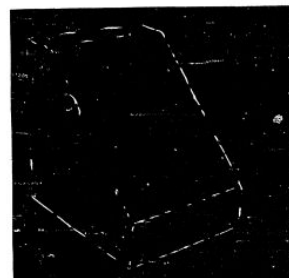
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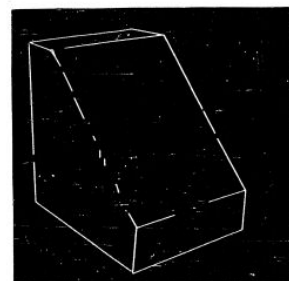
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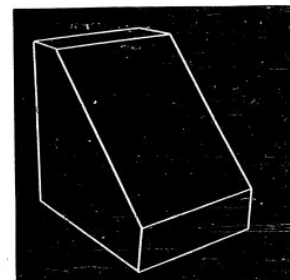
E. Connected Feature Points



F. After Complexity Reduction



G. After Initial Line Fitting



H. Final Line Drawing

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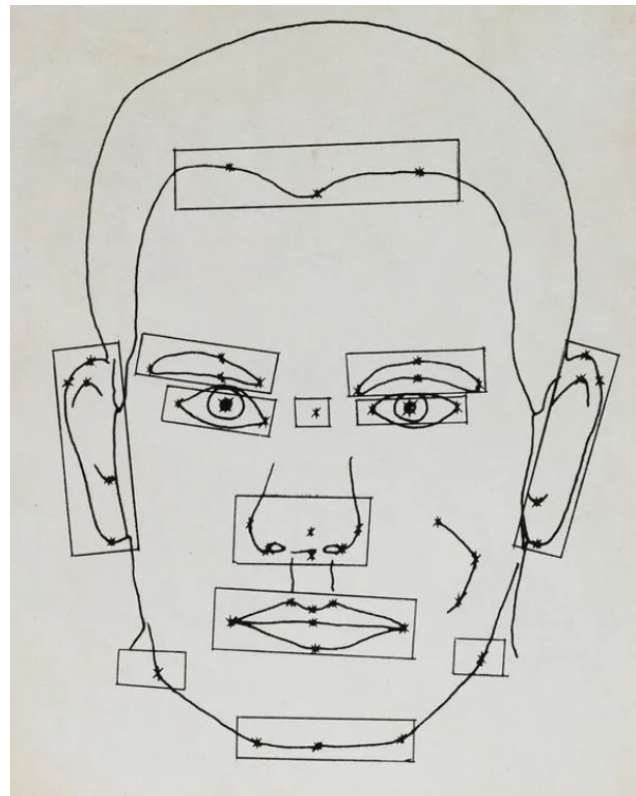
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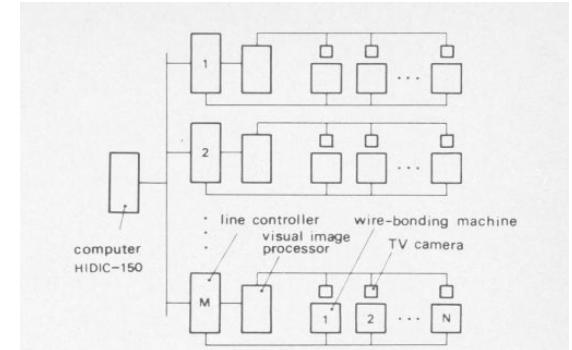


Fig. 2. Automatic transistor assembly system.

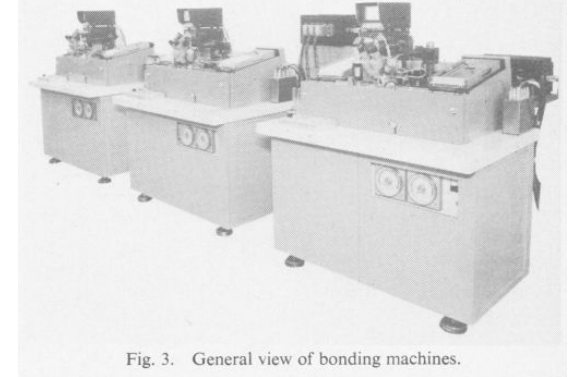


Fig. 3. General view of bonding machines.

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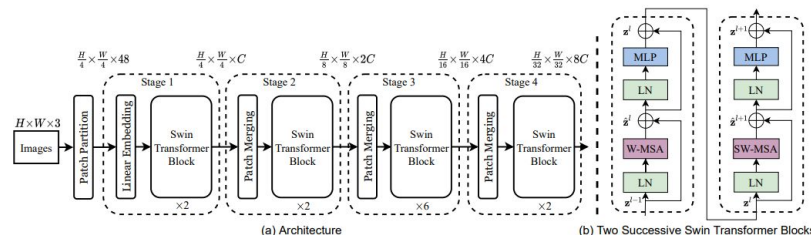
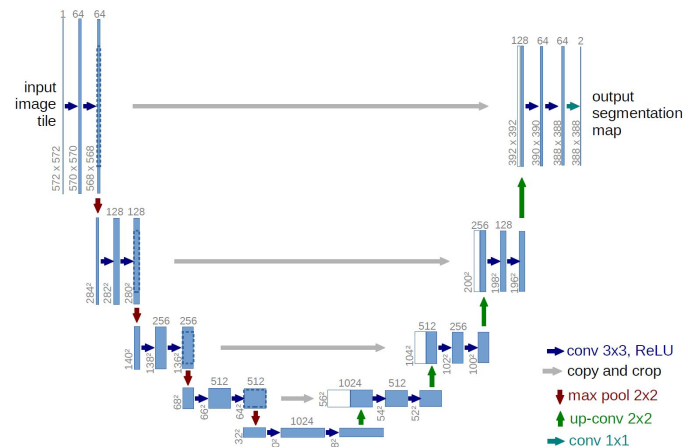
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~2013-Today: Modern deep learning based approaches become popular.



Impact of Deep Learning on Object Detection

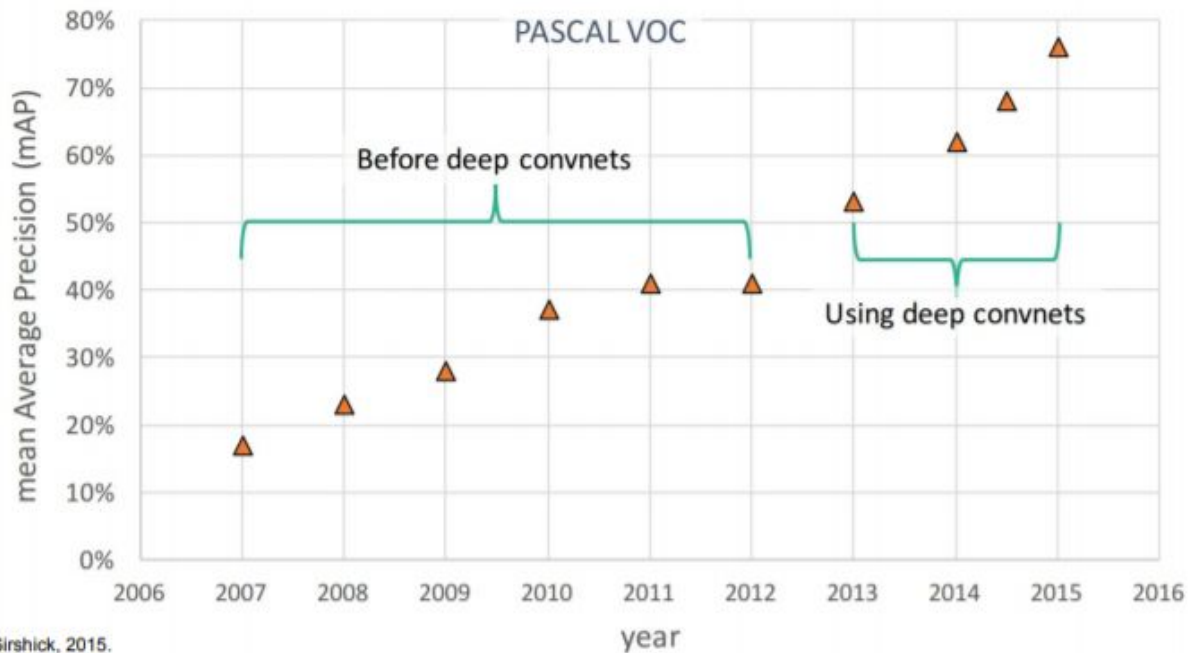
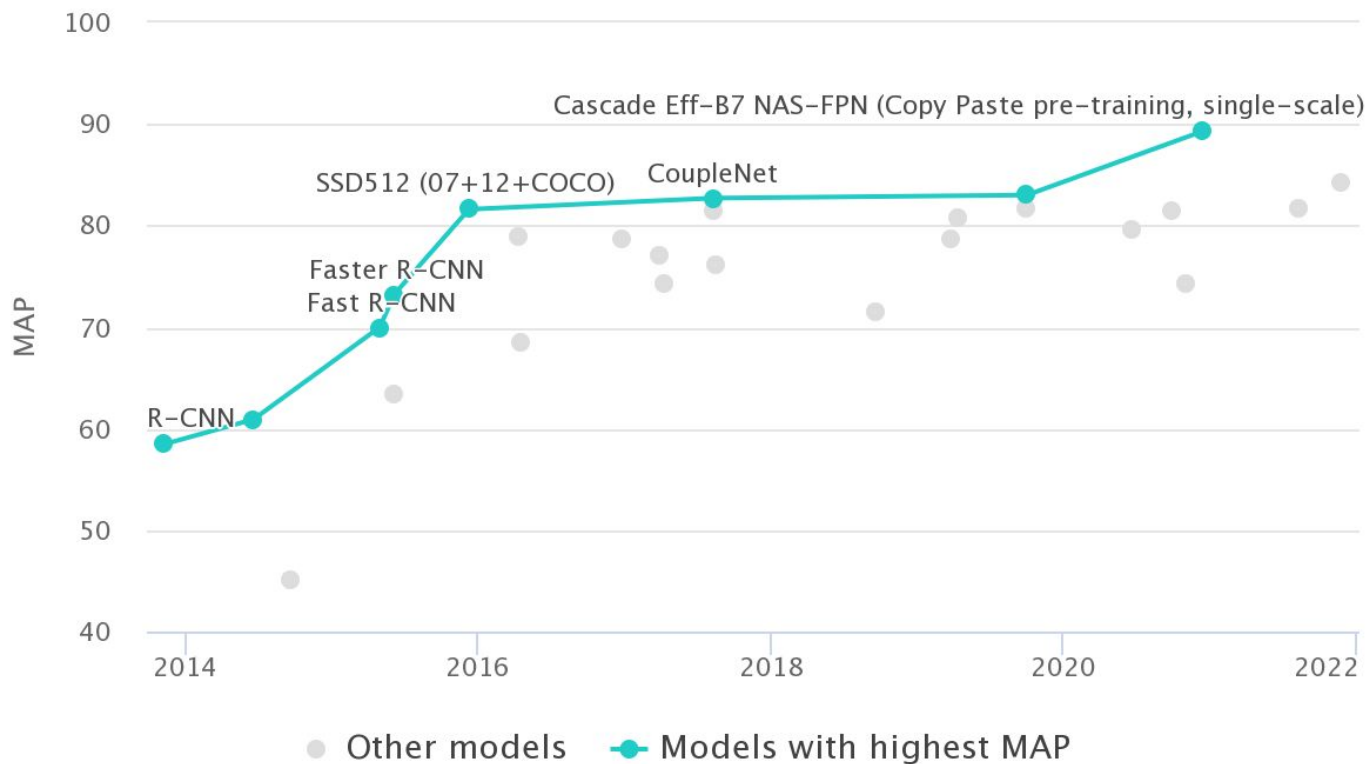


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Impact of Deep Learning on Object Detection



Datasets

Name	Type	Categories	Image size	Images per category	Objects per image
PASCAL VOC (2007, 2012)	Common objects	20	470×380	303~4087	2.4
MS COCO	Common objects	91	640×480	-	7.3
ImageNet (ILSVRC)	Common objects	21	500×400	-	1.5
KITTI	Driving scene	8	1242×375	-*	-*
Cityscape	Driving scene	8	2048×1024	-*	-*
...	...	...			...

Snapshot of Object Detection Methods (till 2019)

