Hybrid Cascade Point Search Network for High Precision Chart Component Detection

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Introduction

Charts are commonly used for data visualization. One common form of chart distribution is in its image form. Existing image object detection methods do not perform well in chart component detection. And traditional rule-based approaches lack enough generalization ability. In order to address this problem, we design a novel two-stage object detection framework that combines point-based and region-based ideas
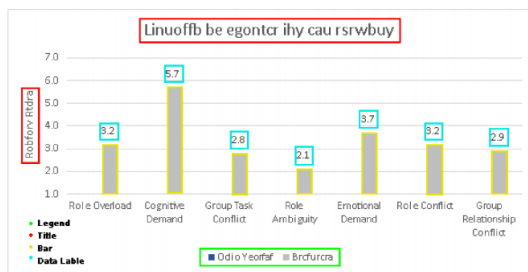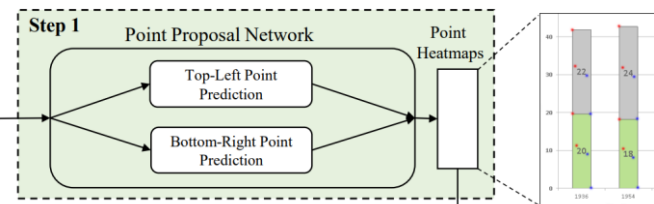
Task

Fig. 4: An example image from ChartDet val set.

We want to mark out the region box of each chart component. The extracted region information can be used for chart data extraction, chart understanding and so on.
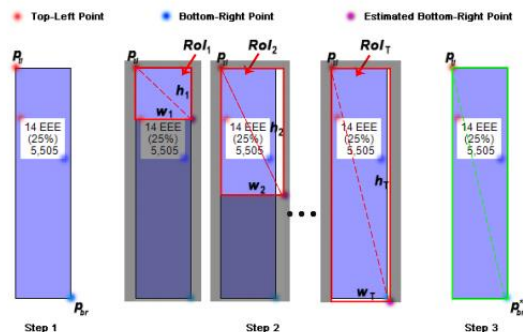
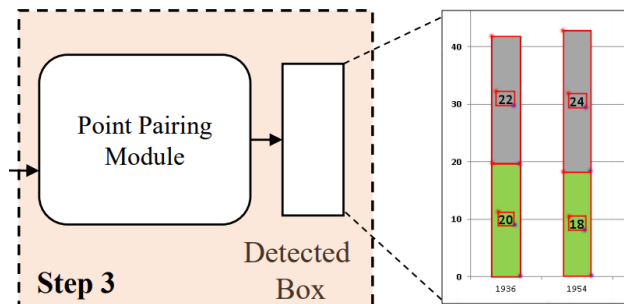## Method

Key Point Proposal

This step is executed by a fully convolutional key point proposal network, which aims to find the potential unpaired top-left and bottom-right points by predicting a heat map of points.

Object Search Network

With the enhanced input image and the predicted top-left points, the target of OSN is to find the main region for each top-left point. And it consists of two modules, Iterative Search Module (ISM) and Fine Truing Module (FTM). They focus on different the stages of the search process.

Point Pairing Module

PPM pairs the predicted top-left point based on the corresponding bottom-right points predicted by Step 1 and the regions predicted by Step 2.

Experiment

Method	AP	$AP_{0.5}$	$AP_{0.75}$	$AP_{0.8}$	$AP_{0.85}$	$AP_{0.9}$	$AP_{0.95}$
Retinanet 101	0.459	0.729	0.497	0.389	0.253	0.110	0.012
Faster-RCNN 101	0.580	0.805	0.664	0.578	0.434	0.233	0.056
Cascade-RCNN 101	0.647	0.831	0.723	0.660	0.552	0.375	0.149
CornerNet	0.646	0.783	0.717	0.674	0.587	0.429	0.225
CenterNet	0.666	0.820	0.742	0.685	0.592	0.429	0.205
HCPN w/o PPM	0.697	**0.870**	0.775	0.714	0.610	0.429	0.222
HCPN	**0.706**	0.868	**0.778**	**0.723**	**0.623**	**0.457**	**0.261**
HCPN (Bar Only)	0.810	0.934	0.873	0.837	0.757	0.635	0.397
Revision (Bar Only)	0.330	0.598	0.316	0.217	0.112	0.032	0.002