Visual Style Extraction from Chart Images for Chart Restyling

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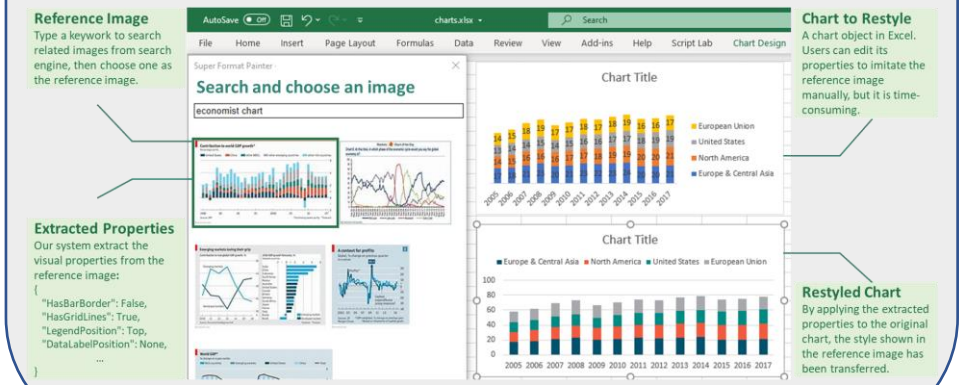
Restyling

Task Formulation: given a chart image, extract its visual properties (e.g., Has Chart Title, Legend Position)
Application: extract properties from well-designed chart images on the Web, to re-style users' chart



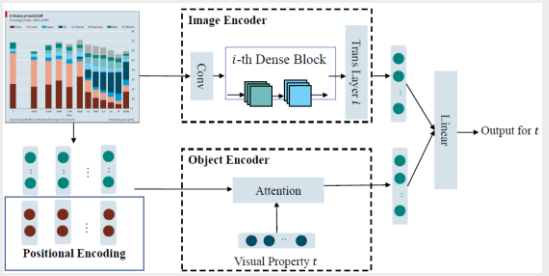
Dataset

- 187,059 chart images from the web
- Annotated with visual properties and bounding boxes of objects in the chart
  - HasBarBorder, HasChartTitle, HasXaxisTitle, HasYaxisTitle, HasGridLines, LegendPosition, DataLabelPosition, ForegroundColor, BackgroundColor

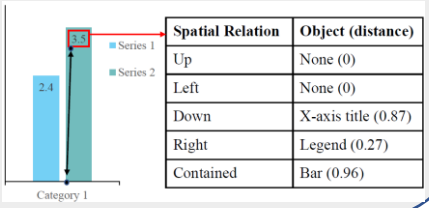
Approach

Image Encoder: encode chart based on DenseNets

Object Encoder: object input with *relative spatial positional encoding*



- Positional indicators for the distance to the nearest object in relation of {*up; left; down; right; contained*}



Spatial Relation	Object (distance)
Up	None (0)
Left	None (0)
Down	X-axis title (0.87)
Right	Legend (0.27)
Contained	Bar (0.96)

Results

Rule system: design rules with Faster-RCNN detection output

Models	ChartTitle	LegendPosition	DataLabelPosition
Rule	91.44%	74.39%	75.52%
Our model	**92.03%**	**94.71%**	**92.14%**
w/o pos.	90.16%	92.76%	91.70%

*only shown prediction of property subsets here

Error Analysis: (1) charts with complicated relations; (2) object detection error propagation