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Generalized IOU addresses the plateau problem in IOU in that it is you for all non-overlapping boxes irrespective of far far apart they are which renders it unsuitable for use as a loss

3-step process

- find the smallest convex shape that encloses both the shapes being compared
- Compute the ratio of the total area of the enclosing shape with the total area occupied by the two shapes
- Subtract the ratio from the standard IOU

process shown to be differentiable for the standard detection use case of axis aligned bounding boxes but not so much for generalized shapes

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Experiments done by replacing the default MSE loss on yolov3 and faster RCNN though the performance improvements seem to be much more significant in the former case