NeurIPS: Neural Vanishing Point Scanning via Conic Convolution

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Vanishing Point Detection
- After perspective projection, parallel lines intersect at the same point, i.e., the vanishing point.
- Vanishing points bridge 2D and 3D by giving the 3D line direction in camera space from a single 2D image.

Applications
- (a) 3D Wordframe Lifting
- (b) Camera Calibration
- (c) Photo Forensics

Related Work
- Traditional Methods
  - Two-stage algorithms
  - First, extract line segments from images
  - Next, cluster lines based on their intersections
  - Not end-to-end trainable
- CNN-Based Methods
  - [1]: Divide images into patches and classify them
  - [2]: Use neural networks to filter outliers
  - Hard to utilize geometric properties of VPs
- Accurate as traditional line clustering algorithms;
- Robust as (convolutional) neural network-based algorithms;
- End-to-end trainable without using existing line detectors;
- Able to capture geometric cues of vanishing points.

Motivation
- Vanishing Point, After Image may result in total failure
- Accurate
- Not end
- Next, First,
- Two
- Traditional Methods
- Military Science and Tactics.
- CNN
- 2D
- Intersections
- in
- Camera
- Calibration
- Related Work
- Applications
- CNN-Based Methods
- [1]: Divide images into patches and classify them
- [2]: Use neural networks to filter outliers
- Hard to utilize geometric properties of VPs
- Robust, but CNN only gives a coarse estimation

Conic Convolution
- (a) VP candidate inside the image
- (b) VP candidate outside the image

Results
- (a) Ground Truth
- (b) True Proposal
- (c) False Proposal

Datasets and Visualization
- NeurVPS: Neural Vanishing Point Scanning via Conic Convolution
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Reference