TJHSST Computer Systems Lab 2005 - 2006
Automobile Recognition
Through the Use of Image Processing Techniques

by Drew Stebbins

Abstract

Many law enforcement agencies have recently shown interest in automated automobile recognition and tracking technologies such as license plate reading or GPS tracking. However, some criminals may drive vehicles that have false license plates or are not equipped with GPS tracking devices, making the pursuit of such vehicles difficult. This project aims to create a computer vision system capable of taking real-time input from a static camera and identifying passing cars by make and model in order to assist law enforcement agencies in the tracking of suspect or stolen vehicles.

Background

Several computer systems currently exist for the tracking of military and civilian automobiles via License Plate Recognition (LPR) or GPS technology. Such systems are in use by law enforcement entities such as US Customs and Border Protection and the UK police, and have proved very e□ ective in catching criminals. However, these systems fail when an automobile has fake or no plates, and no GPS tracking device, and is able to avoid recognition. My system, on the other hand, will be able to alert law enforcement officers of the presence of any specific type of vehicle regardless of whether or not it is equipped with GPS or the proper license plates, assisting in situations such as when an all-points bulletin is put out for a certain vehicle based only on a visual description. In addition, some systems already exist that can automatically recognize military vehicles such as planes, tanks, and armored personnel carriers by their shape, size, and color. However, in the course of my preliminary research I found no existing systems capable of the automated, advanced (ie make and model) recognition of everyday civilian vehicles such as cars, small trucks, semis, etc. My system is similar to that of the existing systems for the automated detection of military vehicles, in that it defines a certain set of characteristics for comparison, extracts those characteristcs from the image of an unknown vehicle or group of vehicles, and searches amongst a list of known vehicles for a possible match. The primary difference between previous types of these systems and my own is that mine is much more precise in terms of characteristics such as size and shape, and when completed, will select possible matches from a much more diverse database.

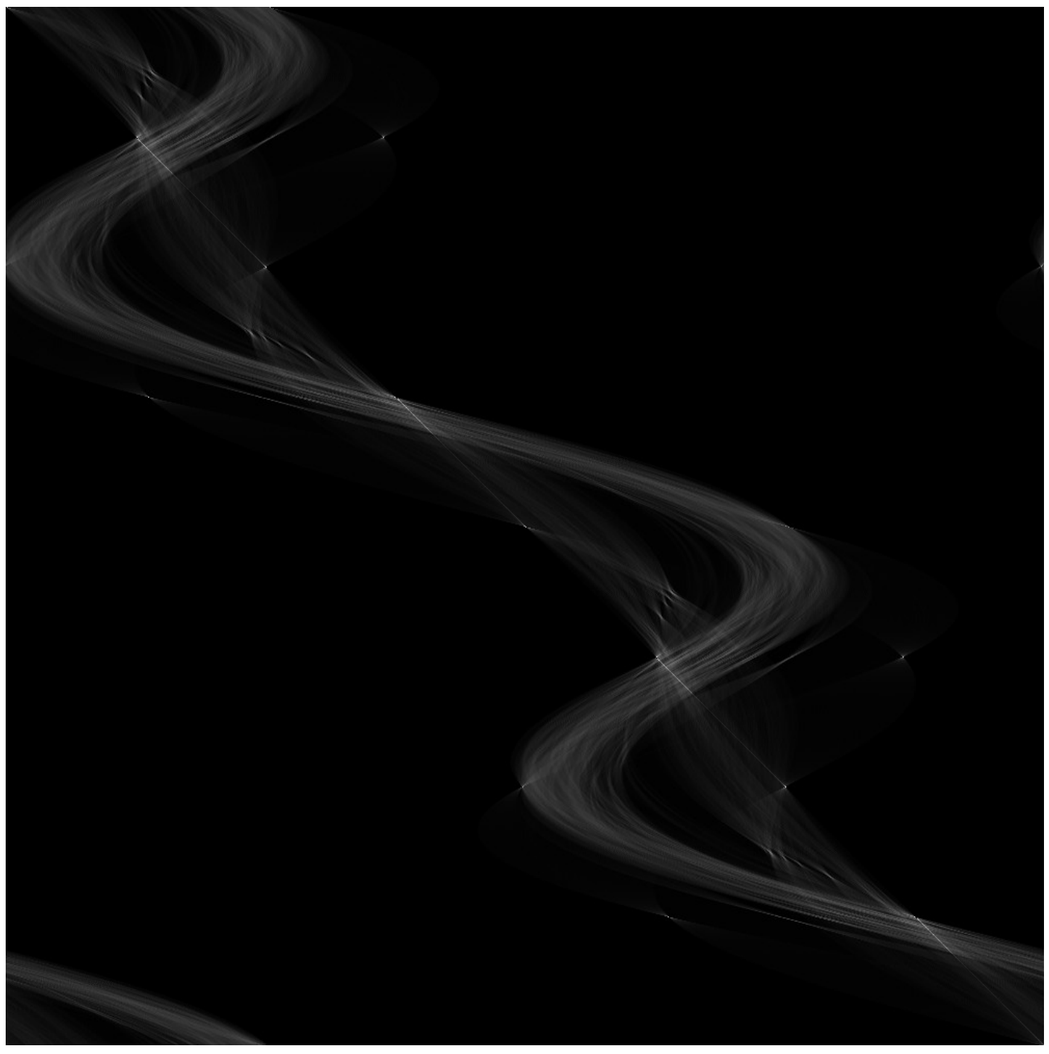
Procedure and Methods

Current, my program uses the Canny line detector, the Hough transform, and a vertex detection algorithm of my own design to extract basic information from still-frame input images. Next quarter I hope to implement custom algorithms for the detection of advanced car features such as general shape, wheel width, and mirror placement. I also hope to implement functional object isolation so that my program can accurately select and identify a car from a background of noise. The language I am doing all of my programming in is C++, which I have selected based on its fast speed and useful optimization capabilities.

Results

As my program is still in development, I am not yet able to test it on real-world input data to achieve meaningful results. I expect to have my program in a rudimentary testable state by the end of second quarter.

Sample input image



Hough space representation of the above sample input