Traffic Prediction Project Competition

CS223B, Winter 2005-06, Stanford University
Pre-competition results due: Monday, March 6, 12:15 PM (in lecture)
Final competition time: Monday, March 13, 11:00 AM (in lecture)

Overview

Your goal is to write software to predict the future positions of cars after processing a video clip. We have provided three sample clips for practice. Your team must submit preliminary results for these clips by the pre-competition due date, but these results will not be graded. The pre-competition will give you a chance to familiarize yourself with the mechanics of the competition and receive some preliminary feedback. On the final competition day, we will provide you with new video clips that you haven't seen before. You will run your software on these clips and provide us with your results within 30 minutes. We will evaluate and display the results from all the teams on the spot. We intend to declare a winner (the team with the best results) soon after the competition.

Input Video Clips

We will provide you with three video clips (each five seconds long, similar to the clips in Assignment 3), on a USB memory stick. For the pre-competition, we will lend one stick to each team in lecture on Wednesday, March 1. We will collect these sticks, with your preliminary results, in lecture on Monday, March 6. On the day of the final competition, we will distribute the memory sticks again, with the practice video clips replaced with new ones.

The memory sticks we lend you will have the following directories:

- `data`: This directory will contain the input video clips.
- `results`: This directory will contain the actual hand-labeled future frames corresponding to each video clip in `data`. You may refer to them to evaluate your results. This directory will only be present during the pre-competition, not during the competition.
- `submit`: You software will output a predicted future frame for each clip into this directory.

For SCPD-only teams ONLY: We will upload the same data to

`/afs/cs.stanford.edu/class/cs223b/www/competition`

and

`http://cs223b.stanford.edu/comepetition/`

The practice data will be replaced with competition data at the beginning of the competition.

What Your Software Should Do

Your software must load a sequence of images corresponding to a video clip (as in Assignment 3) and generate an output image predicting the car pixels in a future image frame, **THREE** seconds after the final frame of the input video clip. The input clips are 5 seconds long, shot at 30 frames per second. Hence, given input frames 1-150, your program should predict pixels corresponding to cars in frame 240. The output must be a binary image in PNG format (all pixels black or white). It should have the same resolution as the

video frames. White pixels in the output image correspond to the car pixels in the future frame, and black pixels correspond to non-car pixels.

Important Dates and Submission Procedures

On **Wednesday, March 1**, we will lend one memory stick (loaded with pre-competition video clips) to each team in the class. Make sure at least one member from your team arrives to collect the stick. You will have to return the memory sticks, updated with your pre-competition results, during class on **Monday, March 6**, by 12:15 PM. Your results (one future frame for each clip, generated by your software) should be saved in the `submit` directory. The output files should be named `clip1.png` (corresponding to video clip 1), `clip2.png` (corresponding to video clip 2), etc. You should also include a text file `team.txt` in the memory stick root directory, containing your team number. We will evaluate your results and provide you with feedback before the final competition.

The final competition will be conducted in class on **Monday, March 13** at 11:00 AM. At least one member of your team must be present with a laptop loaded with your software. We will provide your team with the same memory stick, but with earlier video clips replaced with new ones. You must return the stick with the results **within 30 minutes**. Make sure you save your results in the stick in the same format as in the pre-competition. We will evaluate your results on the spot, as soon as you hand them over to us.

Later, **by 11:59PM** on the final competition day, you must to email us (cs223b+submit@gmail.com) the following items to complete your submission:

- A `code` directory which contains all of your source code. Please make an effort to submit neat, commented code so that we can give partial credit.
- A `readme.txt` file containing instructions for compiling and running your source code.
- A `writeup.txt/pdf` file containing a description of your approach. State your methods for solving the problem and explain what worked and what didn't. Even if your method didn't ultimately perform as well as others, you can still improve your grade by arguing why your approach was a reasonable or clever one. Include the names and email addresses of all of your group members.
- A `submit` directory containing your output images. These should be exactly the same as the images you submitted during the competition.

SCPD-only teams, which did not borrow the memory sticks, can email us (cs223b+submit@gmail.com) their pre- and final competition results, subject to the same deadlines.

Evaluation

We will evaluate your output results based upon the weighted scoring function used in Assignments 1 and 3. This scoring function is: **0.4 × (% correct car pixels) + 0.3 × (100 - % false positive pixels) + 0.2 × (% correct non-car pixels) + 0.1 × (100 - % false negative pixels)**.

This function weights car pixels more heavily than non-car pixels, but gives a baseline score of 50 if all pixels are labeled as car or non-car. As in Assignment 1, we will provide a scoring script based on this scoring function that you can use to test your output against the hand-labeled images in the `results` directory.

When assigning your group a final score we will also look at your writeup and consider a variety of other factors such as the creativity and effort that went into your solution, the efficiency and correctness of your code, and the quality of your documentation. Also, our ability to re-run your software is a requirement for winning the competition. We may invite you to run your software in our presence.

The overall project is worth 40% of your final CS223b grade.