Project Name: License Plate and Non-LP Image Classification

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Note 1:

- The project is implemented in the Matlab 2012a (full version). The project codes are tested and executed on a workstation having Windows operating system.
- First, run Matlab 2012a (or upper versions). It should have the image processing, global optimization and statistical-and-machine learning toolboxes. Choose "Project_Code" as your current folder in the Matlab. Now navigate through subfolders (total 6 folders for 6 phases) to run specific phase of the project. Each of the project-phase folder contains its own README.pdf file. Go through those README.pdf files for more specific instructions.
- It's better to run the experiments sequentially (from phase 01 to phase 06) for better understanding. But its not necessary, because each folder contains pre-generated Matlab data files. So you can test any phase at any time.
- If you find difficulties to run the project, you can contact me at email: `samiul.azam@ucalgary.ca`.

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Note 2:

Brief description of the project phases:

- **Phase 01:**
  - In this phase, I extract HOG features from all Candidate License Plate (CLP) images. Moreover I consider three different resolutions: original size (1x), half (hx) and double (2x) of the original size CLPs. In the next phases, I use only the extracted features during experiment.
- **Phase 02:**
  - In this phase, I tune all four classifiers (based on one of their sensitive parameter) to maximize their performance. In these experiment, I consider all 360 features of HOG. This part is important before applying genetic algorithm (GA) for feature selection.
- **Phase 03:**
  - In this phase, I use binary chromosome based GA for feature selection (applied on all four classifiers separately). The selected features (or HOG bins) are used in the next phases.
- **Phase 04:**
  - In this phase, I generate trained models for all four classifiers (using selected features). These models are used in the mixture of experts model of phase 05.

- **Phase 05:**
  - In this phase, I have conducted experiment to adjust the four weights of the mixture model. Initially, I assign weights based on participation and performance ranking. Then I apply both GA and Particle Swarm Optimization (PSO) separately to find the best weight vector. PSO performs well in this search process.
- **Phase 06:**
  - In this final phase, I use the searched weight vector (provided by the PSO in the previous phase) inside the mixture of experts model, and test it with 1x, 2x and hx sizes of CLPs.

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