CarND Vehicle Detection (P5)

Start:	End:	Total hours:		Engineer:
20170221	**20170313**	206:30		**James W. Dunn**

		Start	Stop	Sub-total		Project log
Tuesday	20170221	07:30	10:30	3:00		Create absdiff test videos, organize directories
		12:25	14:35	2:10		Brainstorm about sliding windows down lanes in overhead and perspective views
				Total	5:10	
Thursday	20170223	07:00	08:30	1:30		Design/develop a project log
		08:30	08:45	0:15		Plan for dynamic scaling/fliplr training images
		10:25	10:35	0:10		Compute HOG for sample images
		13:35	15:00	1:25		Investigate slicing 2,3,4 pieces
		15:35	16:50	1:15		Get SVC operational on local machine, increase test size to max // .9933 acc
		18:00	19:30	1:30		Attempt keras model. Helpful: machinelearningmastery.com/binary-classification-tutorial-with-the-keras-deep-learning-library
				Total	6:05	
Friday	20170224	07:30	09:15	1:45		Investigate lane probe
		13:50	17:40	3:50		Relative sizes along lane, explore shapes with Illustrator
		19:20	21:30	2:10		Further exploration along lanes, quad/square centroid concept
				Total	7:45	
Saturday	20170225	07:00	08:25	1:25		Test 16-way method against GTI images // ep:acc, 7:0.9856, 14:0.9781, 21:0.9859, 28:0.9791

		16:30	19:20	2:50		Gather extra photos of vehicles. Organic vs geometric
				Total	4:15	
Sunday	20170226	08:00	10:30	2:30		Investigate reboot issue; HOG feature vector analysis; texture frequency: local binary pattern // 7:0.9888, 14:0.9906, 21:0.99, 28:0.9912, 35:0.9894 dropout .1
		10:30	11:30	1:00		Attempt concat HOG and lbp // 256node 7:0.985, 14:0.9875, 21:0.9875, 28:0.9869, 35:0.9875; // 512node 7:0.99, 14:0.9906, 21:0.9894, 28:0.9888 // 1024node 7:0.9788, 14:0.985, 21:0.9831, 28:0.9838, 35:0.9869, 42:0.985, 49:0.9875, 56:0.9825, 63:0.9862, 70:0.9875
		13:00	13:30	0:30		768node 7:0.9757, 14:0.9808, 21:0.9802, 28:0.9812
		13:30	16:40	3:10		Remove anomalous images. 600node .15drop 7:0.9781, 14:0.9776, 21:0.98, 28:0.9818, 35:0.979 42:0.9832, 49:0.9804, 56:0.9795 // 500node .15drop 7:0.9776 14:0.979 21:0.9793 28:0.9796 // 500node .05drop 7:0.9775 14:0.9742 21:0.9757
		17:40	23:30	5:50		Sort several captured images; save/restore trained model; run a prediction on a sample; train 14 epochs on full set // only .9 and only .35 on test patch
				Total	13:00	
Monday	20170227	08:45	14:15	5:30		Investigate HOG feature vector shape, and local binary pattern behavior full dataset w SVM: 7:0.8413, 14:0.8348, 21:0.8408, 28:0.8411 Trim nv dataset: retrain HG model: 7:0.8618, 14:0.8622, 21:0.8598, 28:0.8613, 35:0.8624, 42:0.8631, 49:0.8671, 56:0.8681, 63:0.8685, 70:0.8683, 77:0.8665 // only .26 on test patch
		15:15	18:50	3:35		Resize captured photos; retrain classifier 7:0.9578, 14:0.978, 21:0.978 // still not getting acceptable results from test image. Increase dropout to 50% and dense to 1278 7:0.9682, 14:0.9798, 21:0.9786, 28:0.9768 Found issue: missing the scalar portion
		19:40	22:15			Resume analysis of lane vectors to determine scaling factors along path; create simple pipeline to determine if a patch is a vehicle and annotate
				Total	9:05	

Tuesday	20170228	10:00	15:00	5:00		Add strips, determine direction on capturing additional training data
		15:30	18:00	2:30		Capture cars, retrain classifier: 28:0.968 Declining with additional data: 28:0.9561 run additional ep 35:0.9639
		19:30	20:45	1:15		Look into performance issue…slow! HOG costs about 4it/sec Classifier costs 16it/sec Adjust model to include dropout on input node and reduce to 512. 28:0.9613, 35:0.9597 // SVC version is 4it/sec faster, but less accurate at 0.9273. Poly version: 0.9493, but super slow.
				Total	8:45	

Wednesday	20170301	09:00	12:00	3:00		Brainstorm on performance issue, possibly batch the calls to Keras, also leverage use of P4 lines to scan the lanes and locate/minimize search space.
		15:00	16:00	1:00		Test batch mode of prediction on Keras: 7it/sec
		16:30	18:30	2:00		Capture additional frames for training. More definitive sorting, remove middle mix.
		19:00	21:00	2:00		Retrain 28:0.9771, 35:0.979 video: 37.44 seconds to complete. 6.73 fps
		22:25	23:55	1:30		Capture additional frames for training. Attempt adding LBP 28:0.9794
				Total	9:30	

Thursday	20170302	08:00	12:00	4:00		Investigate OpenCV HOGDescriptor; learn of builtin help() function in OpenCV; 35:0.9608, additional ep does not improve. Video: 28.35 seconds to complete. 8.89 fps however, all patches yield true. Problem may be in cv2 lib. Try custom hog w lbp: 35:0.9838 32.53 seconds to complete. 7.75 fps Begin centroid calcs
		13:30	18:30	5:00		Brainstorm rigging possibilities to outline vehicles, build centroid plan, rig keyframes, formula fitting
		19:30	21:00	1:30		Vehicle class construction. Predominant color determination
				Total	10:30	

Friday	20170303	08:00	09:00	1:00		Color thresholding b/w, black vehicle model should reject white cells

	13:00	14:00	1:00		Explore the rig concept further in Illustrator; fitting to binary image
	14:30	16:20	1:50		Investigate histograms and Canny
	17:50	19:25	1:35		Determine centroid location from a list of cells, geometric center
			Total	5:25	

Saturday	20170304	09:50	12:15	2:25	Explore cv2.moments() to calc geo-center, create elliptical mask to filter stray cells
		14:45	18:00	3:15	Retest hog using 1x1blocks; 35:0.9731 , myhog: 35:0.9785
		19:45	21:45	2:00	histoGrad() implementation
		22:10	23:55	1:45	debug: epsilon scaling to angle results from cartToPolar
				Total	9:25

Sunday	20170305	12:15	15:45	3:30	
					Retrain using histoGrad: 35:0.9848, 49:0.9892. Attempt adding small patch to the model input to train on color: 35:0.9907, 49:0.9882 20.54 seconds to complete. 12.27 fps Add several more frames during emergence from occlusion. 35:0.9943. Convert prediction matrix to centroid matrix
		17:00	20:40	3:40	Install locateCentroid into pipeline, debug
		22:10	23:55	1:45	Add fractional component to screen display of centroid. 20.74 seconds to complete. 12.15 fps Add ellipse overlay, add inverted binary image overlay
				Total	8:55

Monday	20170306	07:30	11:30	4:00	
					Additional brainstorming on vehicle framework tracking using elliptical skeleton. Process complete project video as backup: 107.54 seconds to complete. 11.73 fps. Capture a false positive bridge frames for training: 35:0.99, 49:0.9909. Begin outline for write up. Capture "holes" with neighboring positives: 35:0.9901, 49:0.9906 101.48 seconds to complete. Several more frames 12.43 fps 35:0.9906, 178.28 Seconds to train Net; 103.01 seconds to complete video@ 12.24 fps
		13:00	16:00	3:00	Equations for lane 'slot'. Build averaging queue for ellipse

		16:45	21:10	4:25			Design rig in Illustrator, normalize coordinates in Excel, then implement in Python
		22:10	23:55	1:45			Additional training data: 35:0.9922 determine bounding box of white vehicle
					Total	13:10	
Tuesday	20170307	08:30	12:00	3:30			Code cleaning, vehicle class, debug reshape prior to ellipse call:　　need to set strides = (60,4)
		13:25	19:50	6:25			Continue vehicle class, reorg code, redirect to bounding box code from lecture notes. Unit test, integrate with cell model, test runs on short videos. Full video: 130.83 seconds to complete@ 9.64 fps
		21:00	23:55	2:55			Ellipse overlay. Discover problem with earlier stride 'fix': affecting the ellipse rendering further down the pipeline - centroid computation running astray. Explore scipy label.
					Total	12:50	
Wednesday	20170308	00:00	01:30	1:30			Further design work on vehicle isolation. Challenge video test…collect more data.
		08:00	13:00	5:00			Implement vehicle isolation concept // result unacceptable. Challenge data retrain: Test accuracy of model 35:0.9872 Roll back to single box version and address splitting wide boxes, eg: at frame 240 in Black, 294 109 2.69724770642 ((961, 401), (961, 510)) Processing release candidate video: 124.77 seconds to complete @ 10.11 fps
		15:00	19:30	4:30			Subwindow re-prediction concept using bounding box lead/trail edges as reference to refine new bounding box. Continue writeup. Test zero mean and unit variance.
		20:00	21:00	1:00			Continue variance check.
		22:00	23:55	1:55			Continue work on writeup.
					Total	13:55	
Thursday	20170309	08:00	12:30	4:30			Writeup, create illustrations, analysis section
		14:00	21:20	7:20			Plots, sliding windows, HOG
		22:05	23:55	1:50			Investigate k-norm

				Total	13:40	

Friday	20170310	00:00	01:30	1:30		Writeup continued, integreate pipeline design and classifier illustration
		08:00	12:00	4:00		Fork doc, data quality, the grid,
		13:20	19:30	6:10		Visualizations of pipeline stages
		20:00	23:55	3:55		More visuals
				Total	15:35	

Saturday	20170311	00:00	01:45	1:45		Continue writeup visuals
		09:00	13:55	4:55		More refinement of sections, spatial color, replace hog viz images
		15:10	18:00	2:50		Code cleanup and reorg
		19:40	23:55	4:15		Retrain with new code organization…35:0.9916 124s to process video Begin port from Word to InDesign. Craft updates to diagrams to replace quick snap placeholders.
				Total	13:45	

Sunday	20170312	00:00	02:00	2:00		Continue writeup visuals (DST starts)
		03:00	05:30	2:30		Math equations in Illustrator
		11:20	14:50	3:30		Continue porting the video implementation section, refine the search window section
		15:15	16:10	0:55		Discussion section, text wrapping
		16:30	18:25	1:55		Refine 0-9 implementation section with output visualization
		19:00	23:55	4:55		Discussion section, refinement overall, TOC, test pdf
				Total	15:45	

Monday	20170313	00:00	06:00	6:00		Continue writeup, refs, spell check, page fixes, upload final video, pack training set
		12:30	15:15	2:45		Shipping manifest, test toc links, further research section, pixel alignment cycles

15:15	16:30	1:15		Compose final submission folder. End p5
		Total	10:00	