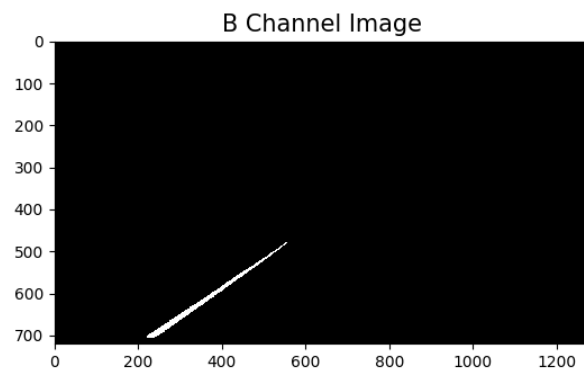
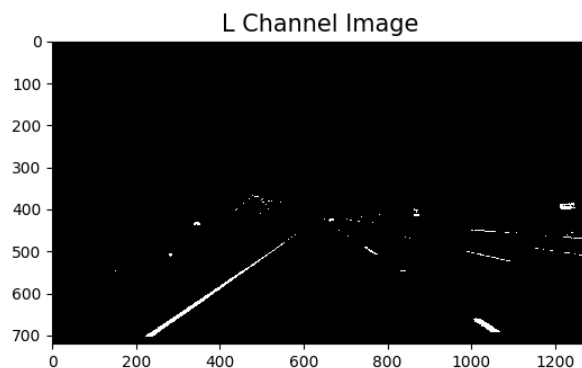


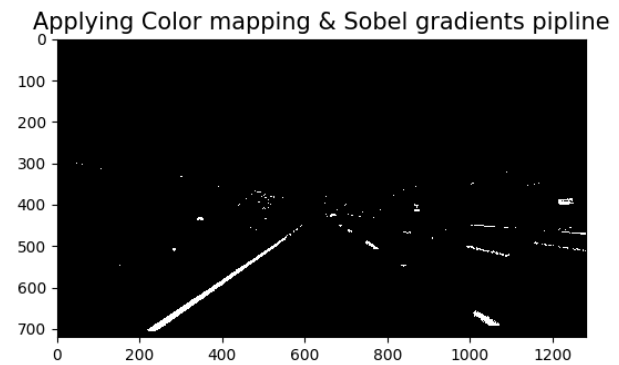
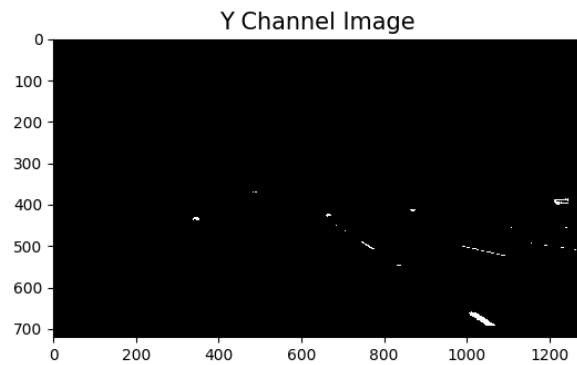
## **Appendix to the Advanced Lane Finding Report**

Trying to get rid of the glitches in the project video output, I have revised the image processing pipeline to fine some techniques, remove the problematic techniques and more effective ones. I have also extracted the frames with glitches from the video and analyzing it separately (example: the frames with shades @ the 41<sup>st</sup> and 42<sup>nd</sup> seconds). Several channels of various color spaces have been investigated to include the most effective ones. The final objective have been reached, and the following are the conclusive points reached:

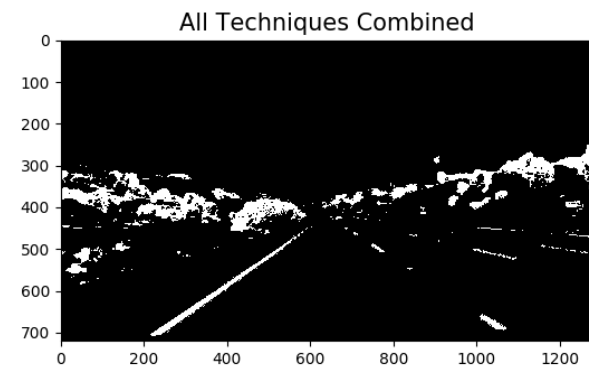
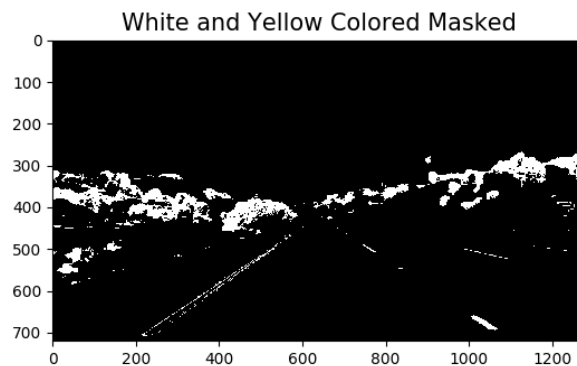
1. The implementation of the new pipeline can be found in "P3 AdvLane3.py" lines 292=>336.
2. The Sobel operators have been proven effective and their tuning were almost good. So, absolute Sobel gradient x, absolute Sobel gradient y, absolute Sobel, and directional Sobel transforms have been all included in the final pipeline, as implemented in "P3 AdvLane3.py" lines 186=>229.
3. The channel S of the HLS color space was found problematic especially in areas with fragmented shades (41<sup>st</sup> Second of the video). Therefore, it has been removed from the pipeline.
4. The B channel of the LAB color space; implemented in "P3 AdvLane3.py" lines 264=>269; has proved very effective in extracting the yellow color or in other words the yellow lane line as shown in the figure below.
5. The L channel of the LUV color space; implemented in "P3 AdvLane3.py" lines 278=>283; has proved very effective as well in extracting both the white and the yellow lane lines as shown in the figure below.



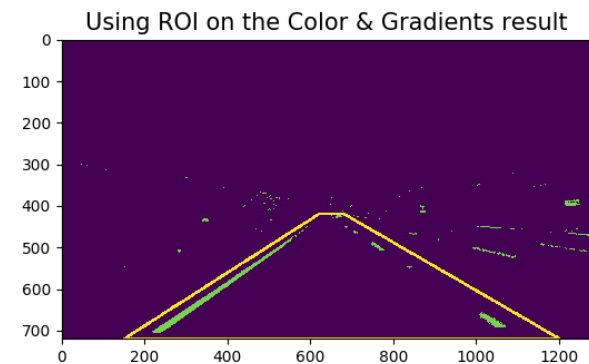
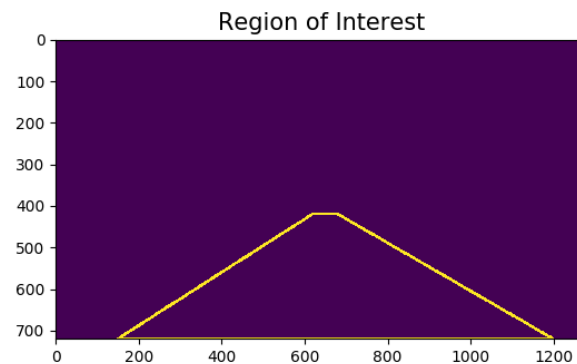
6. The Y channel of the of the YUV color space; implemented in "P3 AdvLane3.py" lines 285=>290; has proved very effective in extracting the white lane lines as shown in the figure below.
7. The resultant of the Sobel gradients and above color channels is shown in the figure below as well.

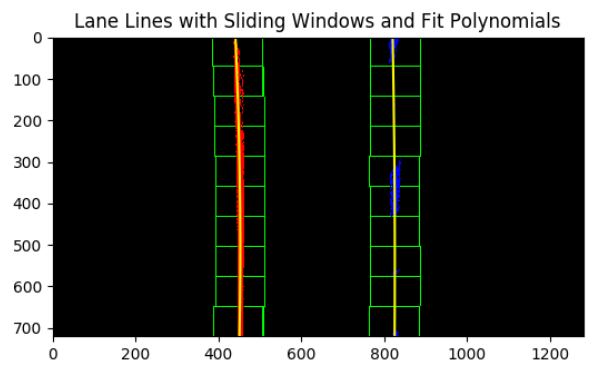
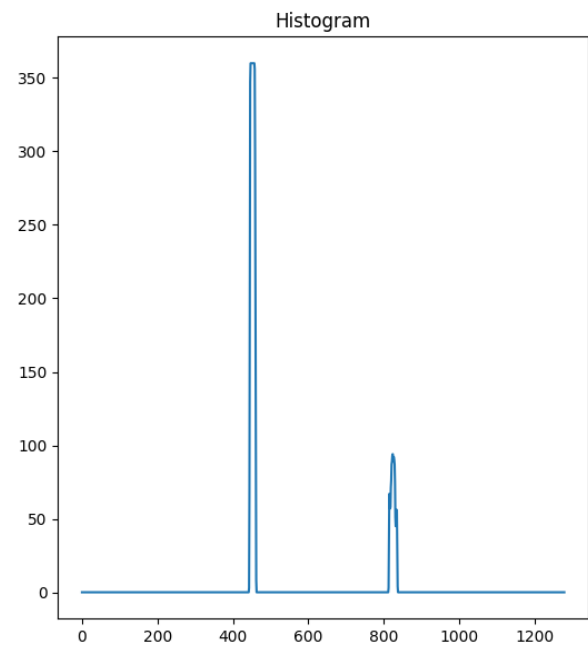
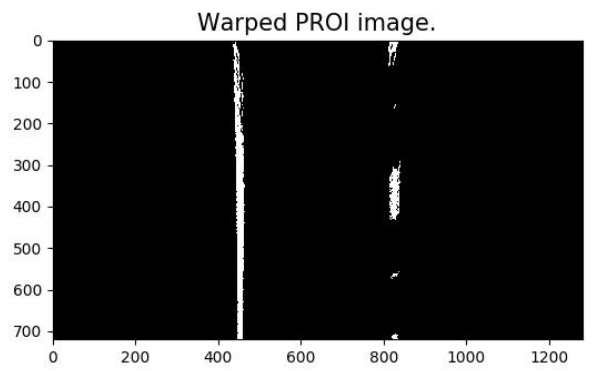
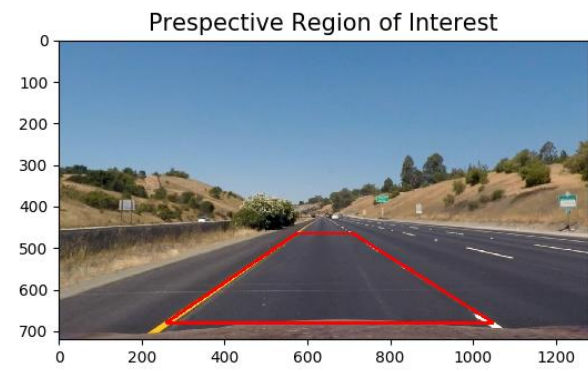
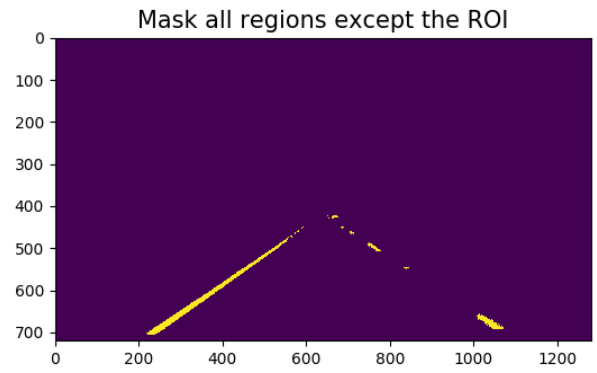
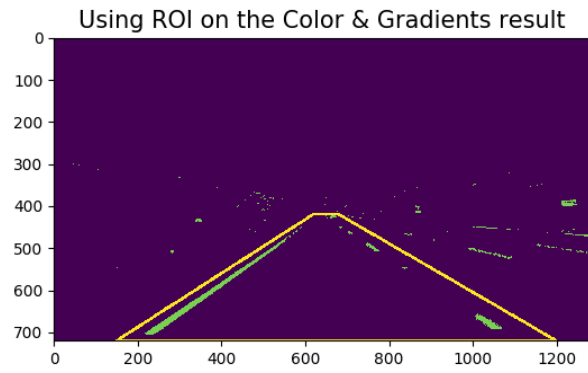


8. White color is extracted as well by filtering the RGB color space as implemented by the "RGB\_select\_White()" function implemented in "P3 AdvLane3.py" lines 256=>262.
9. Yellow color is extracted as well by filtering the HSV color space as implemented by the "HSV\_select\_Yellow()" function implemented in "P3 AdvLane3.py" lines 247=>254.
10. The resultant binary image of the combine white any yellow filtering is show in the figure bellow, as well as the resultant of all the techniques combined.

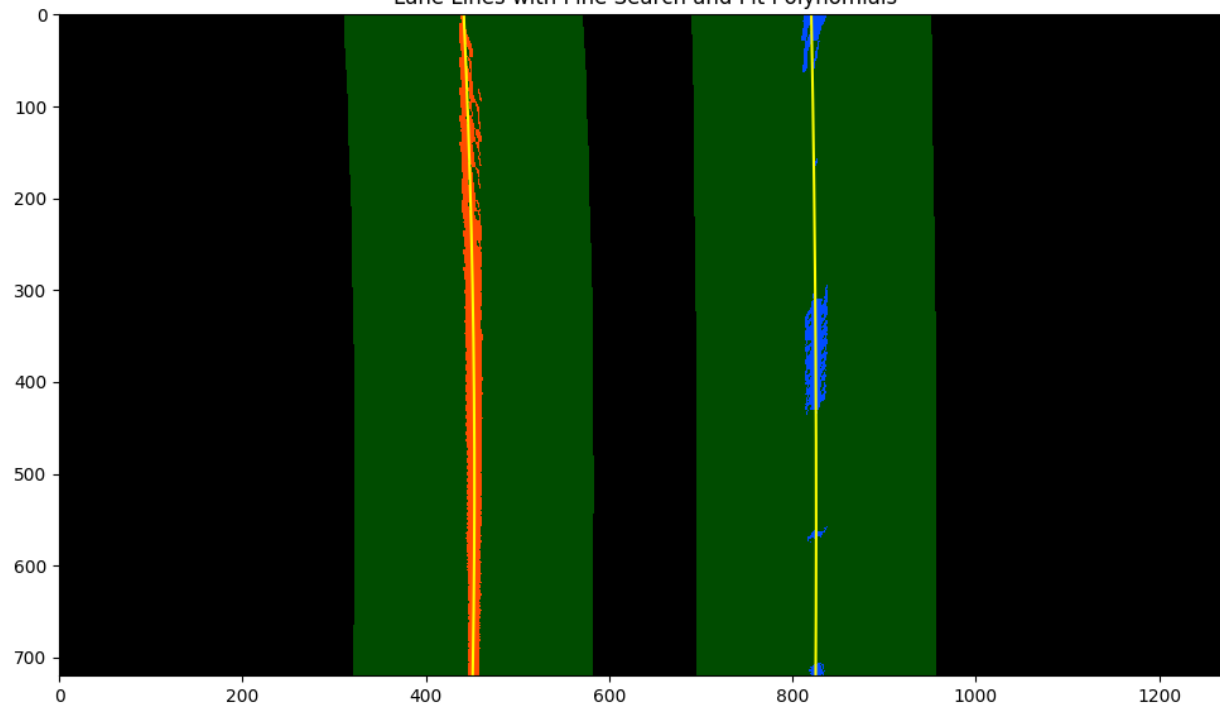


11. The rest of the image processing pipeline continues as in the previous report with resultants outputs shown the figures below.





Lane Lines with Fine Search and Fit Polynomials



Located Lane Highlighted

