Video Re-sampling and Content Re-Targeting for Realistic Driving Incident Simulation
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Overview
Real-time dynamic video generation and visualization for integration into a driving incident simulator is presented. Our approach generates an output video signal using temporal video re-sampling [1], object extraction [2] and re-targeting [3] techniques.

Video Up-Sampling
Motion Frame Rate Up-Conversion [1] is used to generate an up-sampled video sequence with sufficient frame sampling to maintain perceptual video realism in response to variable speed demands from the simulator. Up-sampled video frames are generated from an inter-frame block matching approach off-line and stored for on-demand responsive use.

Object Extraction
Incident object sequences are extracted and stored from a set of samples videos recorded against a ready-segmentable background. Background differencing information is used both to track the object and automatically set the background/foreground seed pixels needed to perform Grabcut object segmentation [2] on a frame by frame basis for extracted object sequence generation (above).

Object Insertion
SURF key point matching [3] is used to identify the signature of artificial or natural scene markers at which an appropriate randomly selected object sequence is selected for insertion. Objects are dynamically re-scaled, inserted and blended (with responsive real-time constraints) in each subsequent frame until either the end of the object sequence or the driver field of view passes the object transition path.

Summary
Our approach supports realistic driving incident video visualization with dynamic object insertion and variable speed support within real-time responsive demands. Future work will investigate object occlusion, real-time object re-lighting and shadow formation.