## **Visual Exploration and Analysis of Videos** with Interactive Annotation





# Summary

We present VIVA, a novel interactive tool for visually exploring and searching long videos. Videos consist of unstructured and multi-modal data, but the necessary metadata for video data exploration may not always be available. VIVA offers an an interactive machine learning (iML) workflow for rapidly creating annotations, as well as a *focus+context* interface to support browsing and incremental sensemaking.



### Focus + Context Visualization

### Interactive Annotations

VIVA's focus+context visualization displays frame snapshots in the context of a video stream and provides a variety of exploratory interactions. An overview of the video is provided as a series of frames: keyframes are fully expanded (focus) while similar ones around it are collapsed (context). Additional context is provided in the form of annotation timelines, which support *zooming* and *filtering* interactions within the video.

VIVA displays annotation timelines that users can iteratively refine using an iML workflow. Some annotation timelines are pre-populated using computer vision models and others are user-created to capture *high-level concepts*. The iML workflow allows users to specify a minimal set of frames that define their high-level concept and then refine machine predictions by labeling suggested frames as correct or incorrect.





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#### VIVA: Visual Exploration and Analysis of Videos with Interactive Annotation.

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