Efficient Multi-purpose Video Annotation for Fast Labeling

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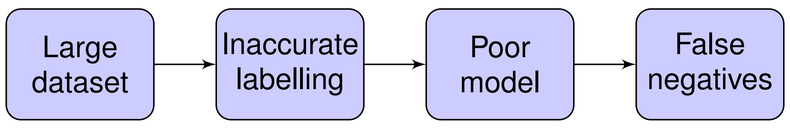
Problem Definition

- Creating high-quality annotations can take up to 80% of the development time of a machine learning project.



Proposed Solution

- A **video annotation method** that **tracks the location of the cursor** while the video is playing and does not require the user to click on each individual frame, thereby **reducing the time needed for consistent labeling**.

Introducing the Interface

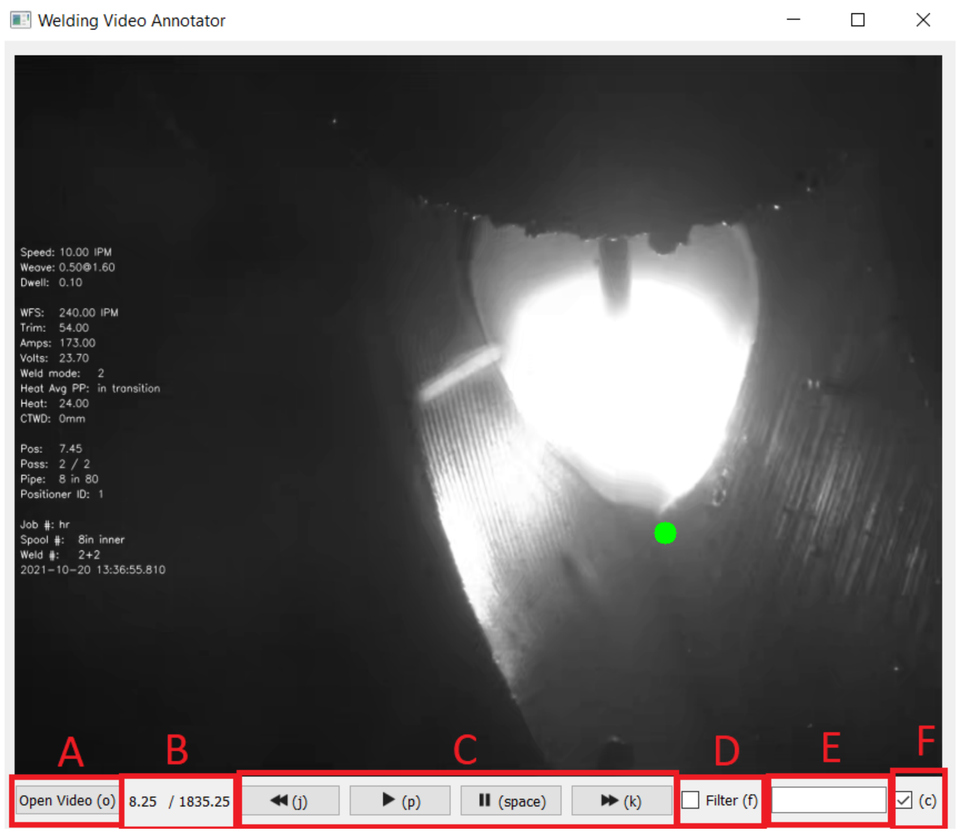


Fig. 1: The proposed video annotator interface.

- Button A (short key : “o”): data loading.
- Box B: current timing of the presented frame.
- Buttons C (short keys “j”, “p”, “space”, and “k”): video player features
- Checkbox D (short key : “f”): equalizer filter
- text box E: classification features
- Checkbox F (short key "c"): enables cursor tracking

conclusion

- We introduce a **fast, consistent, and open-access interface** for **video dataset labeling**, suitable for offline use and confidential data.
- Our interface accelerates the welding application labeling by **21 times**, offers dataset filtering, and supports multiple labeling tasks including **keypoint detection, object detection, and segmentation**.
- Future improvements include **machine learning predictions** for future frames and **collaborative annotation** features to boost annotation consistency.

Applications

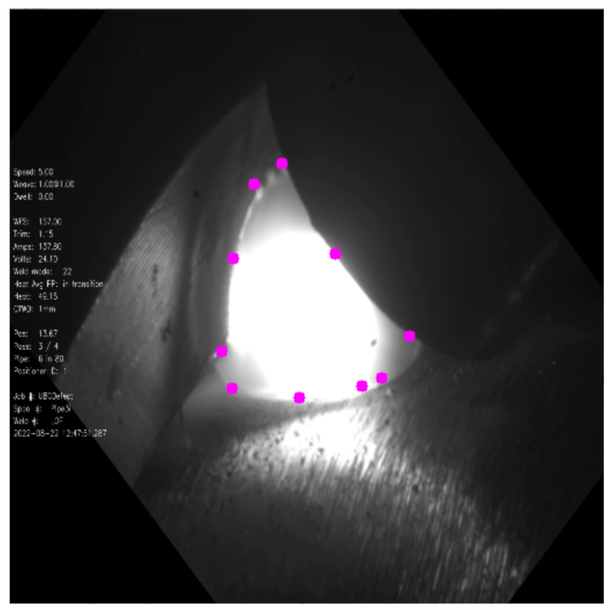


Fig. 2: The segmentation application. The users may use multiple points to create a boundary of an object for segmentation purposes when the shape of the object is homogeneous.

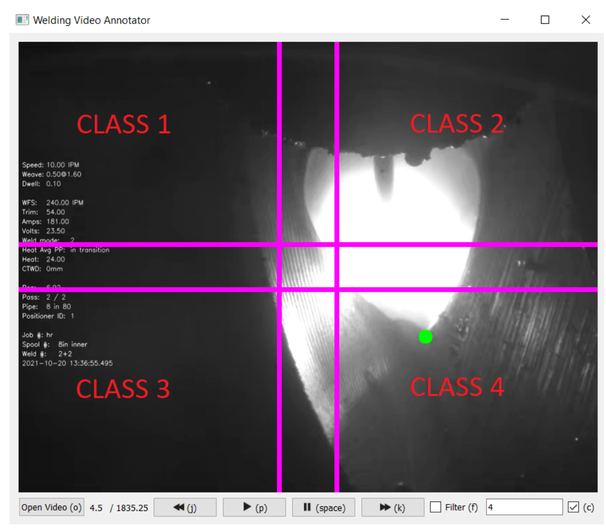


Fig. 3: The multi-class application. The interface divides the frame into 4 main areas and transit areas in between, which represent 4 classes and null one, respectively.

Results

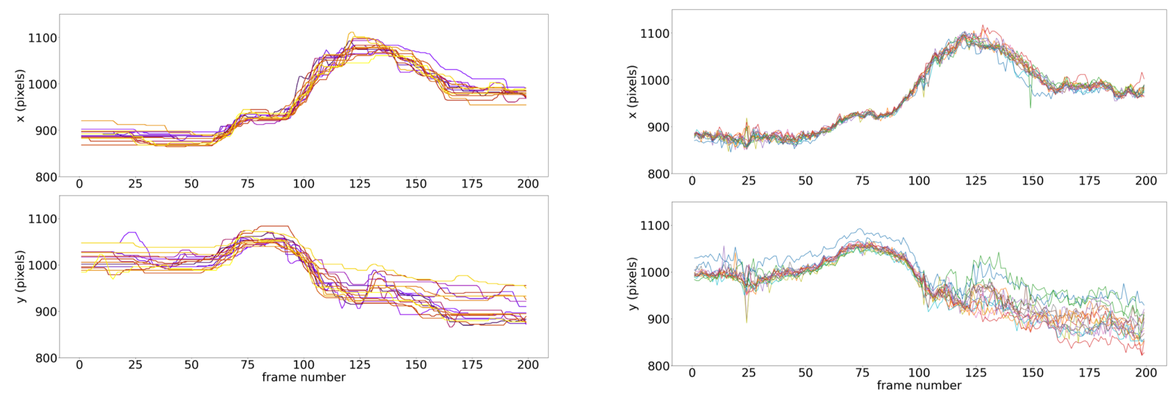


Fig. 4: Comparing the **time series** behavior of the (x,y) location of the cursor labeled by **sixteen annotators** to evaluate labeling consistency.

Metrics	Our interface	IVAT
ICC3k for x location of annotated point	0.99099	0.99929
ICC3k for y location of annotated point	0.98141	0.99370
average annotation time (s)	41.58	868.14

Table 1: Comparing the Intraclass Correlation Coefficient and the average annotation time for 16 annotators using our interface and IVAT interface

ICC value	Reliability level
0 to 0.5	poor
0.5 to 0.75	moderate
0.75 to 0.9	good
0.9 to 1	excellent

Table 2: Level of reliability based on Intraclass Correlation Coefficient