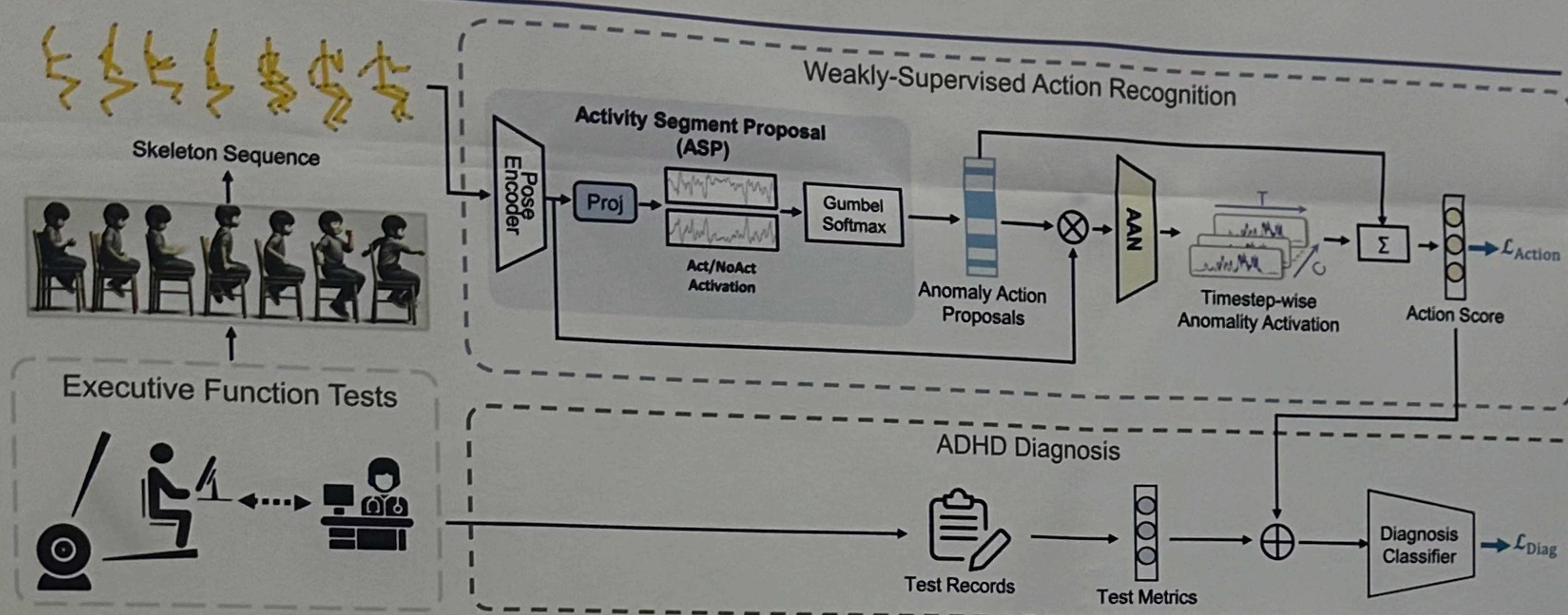


Explainable ADHD Diagnostic Framework Using Weakly-Supervised Action Recognition

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Our Framework



What is ADHD?

Attention Deficit Hyperactivity Disorder (ADHD), a prevalent neurodevelopmental disorder.

Current clinical diagnosis relies on composite evaluations combining standardized rating scales, behavioral observations, and executive function assessments.

The current diagnostic method is limited by subjectivity, a lack of quantitative metrics, and disjointed analysis, leading to inconsistent and uncertain diagnoses.

The EDWAR framework first requires subjects to complete standardized executive function tests. Behavioral recordings are synchronously captured via cameras during testing and converted into skeletal sequences, which serve as inputs for a two-stage collaborative reasoning framework. The weakly-supervised action recognition module extracts time step-wise anomaly activations and video-wise anomaly scores from skeletal sequences, while the ADHD diagnosis module integrates these scores with executive function test metrics for diagnostic prediction.

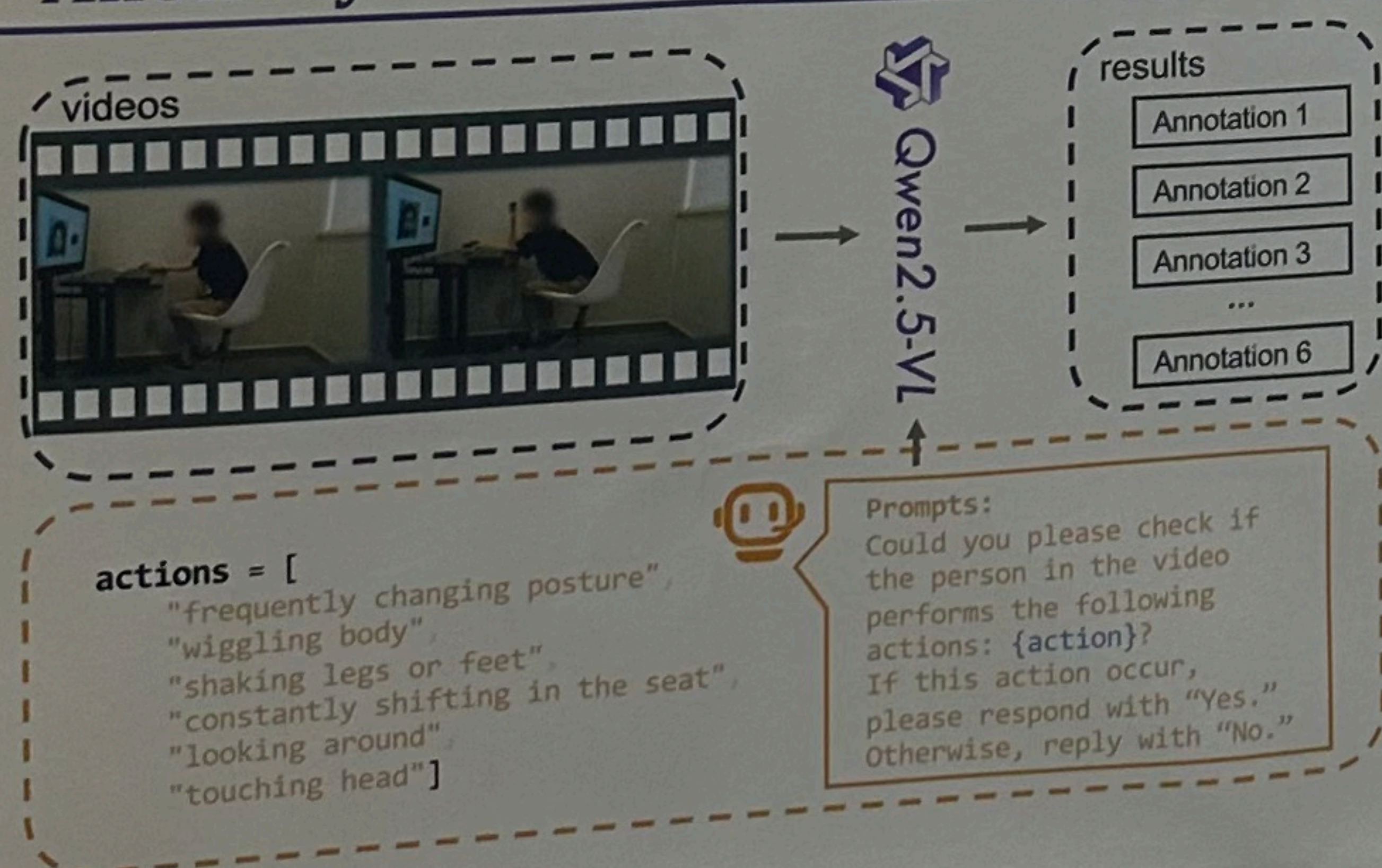
Experiments

Method	Type	Accuracy	Recall	Precision	F1-score
SVM [3]	T	0.684	0.504	0.508	0.506
Decision Tree [5]	T	0.722	0.643	0.646	0.645
Random Forest [23]	T	0.692	0.518	0.535	0.526
Logistic Regression [23]	T	0.714	0.568	0.606	0.586
MLP [8]	T	0.741	0.922	0.766	0.837
bi-LSTM [28]	A	0.849	0.929	0.868	0.897
Bert [28]	A	0.853	0.910	0.887	0.898
ADR [17]	A	0.805	0.894	0.840	0.866
ADR-T [17]	T+A	0.797	0.904	0.825	0.863
AVEN [21]	A	0.867	0.917	0.899	0.908
AVEN-T [21]	T+A	0.871	0.925	0.898	0.911
Bert* [28]	T+A	0.916	0.905	0.885	0.895
EDWAR (Ours)	T+A	0.943	0.950	0.915	0.932

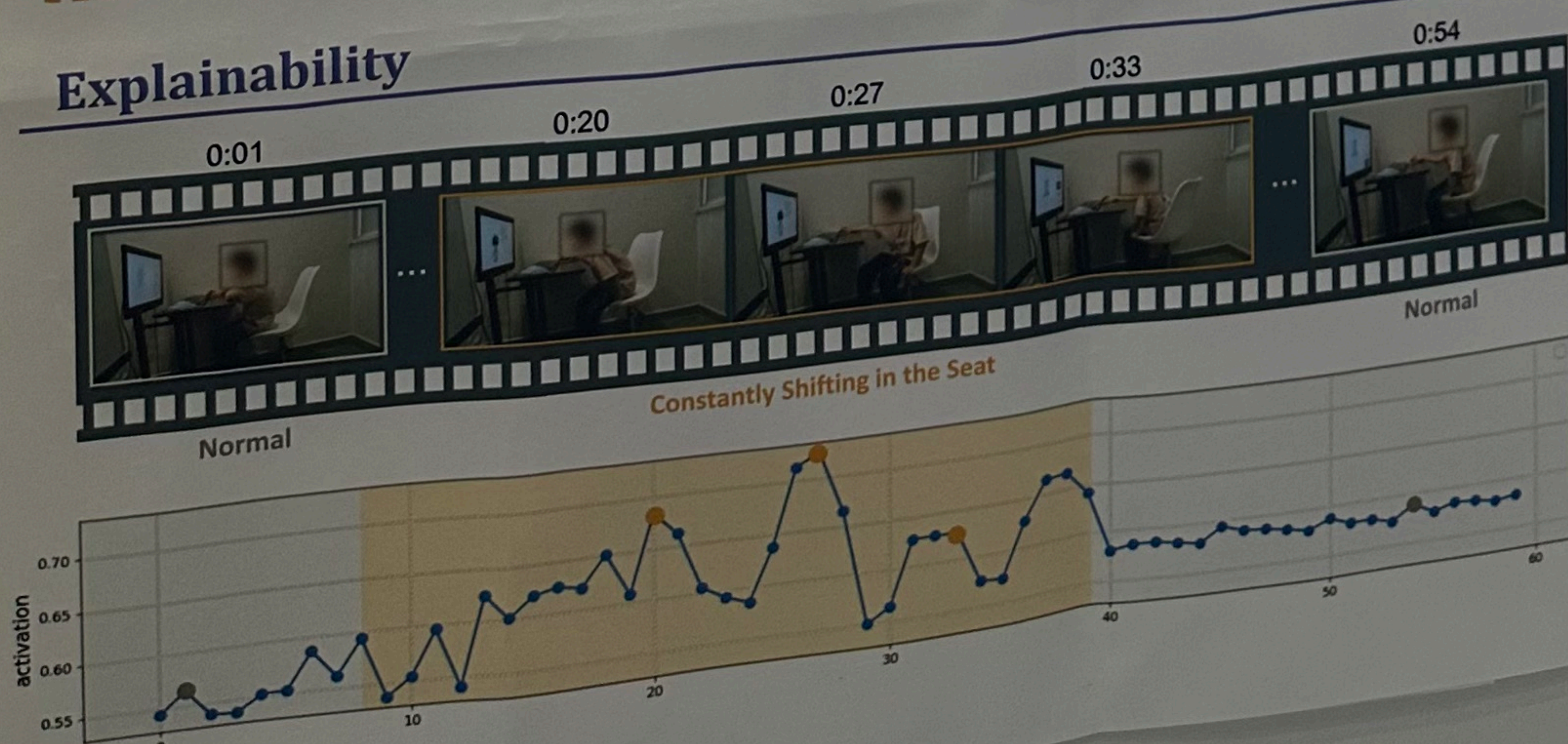
AR mode	WSAR	TM	\mathcal{L}_{Action}	Accuracy	Recall	Precision	F1-score
Co-Learning				0.921	0.905	0.897	0.901
		✓		0.916	0.905	0.885	0.895
			✓	0.918	0.916	0.889	0.902
		✓	✓	0.941	0.931	0.916	0.923
	✓			0.938	0.933	0.920	0.926
	✓	✓		0.943	0.926	0.923	0.924
Pre-trained AR			✓	0.925	0.909	0.905	0.907
		✓	✓	0.943	0.950	0.915	0.932
	✓		✓	0.767	0.500	0.383	0.434
	✓	✓	✓	0.406	0.580	0.665	0.620
			✓	0.767	0.500	0.383	0.434
	✓	✓	✓	0.842	0.684	0.849	0.758

- WSAR: the proposed Weakly Supervised Action Recognition module
- TM: clinical Test Metrics

Anomaly Action Annotation



Explainability



- Top: ADHD test video showing postural dynamics.
- Bottom: EDWAR's per-timestamp activations for "constantly shifting in the seat."
- Shaded spans mark anomalies.