

RICA²: Rubric Informed, Calibrated Assessment of Actions

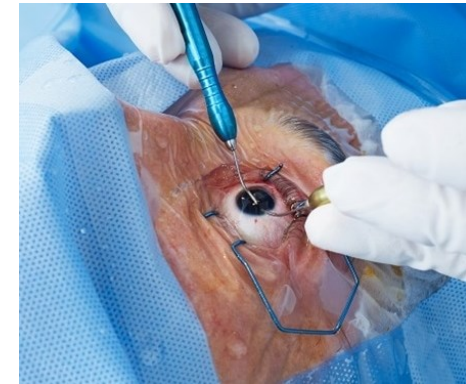
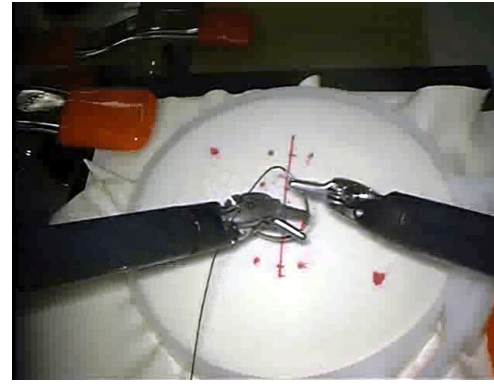
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Assessing Quality of Actions



Sports and physical therapy



Routine surgery



Demo



Judge score: 63.0

Our method:

Predicted score: 63.1

Uncertainty: Low

Baseline (TPT)

Predicted score: 64.4

Uncertainty: Average



Video: FINADivingWorldCup2021_Men10m_final_r3, 0

Bai, Yang, et al. "Action quality assessment with temporal parsing transformer." *ECCV* 2022.

Demo



Judge score: 8.1

Our method:

Predicted score: 19.49

Uncertainty: High

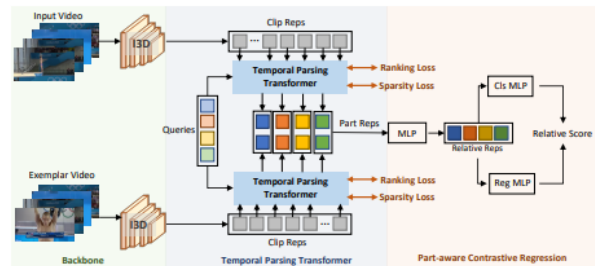
Baseline (TPT)

Predicted score: 19.03

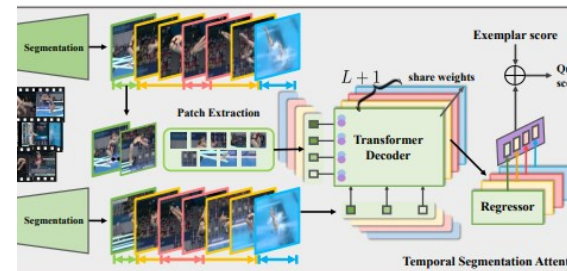
Uncertainty: Average



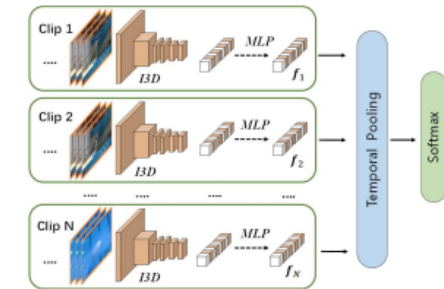
Existing work



Yang et al., ECCV 2022



Xu et al., CVPR 2022



Tang et al., CVPR 2020

- End to end methods mapping video to scores directly
- Lack adherence to scoring rubrics.
- Exemplar based, requiring training videos during inference.
- Missing/uncalibrated prediction uncertainties.



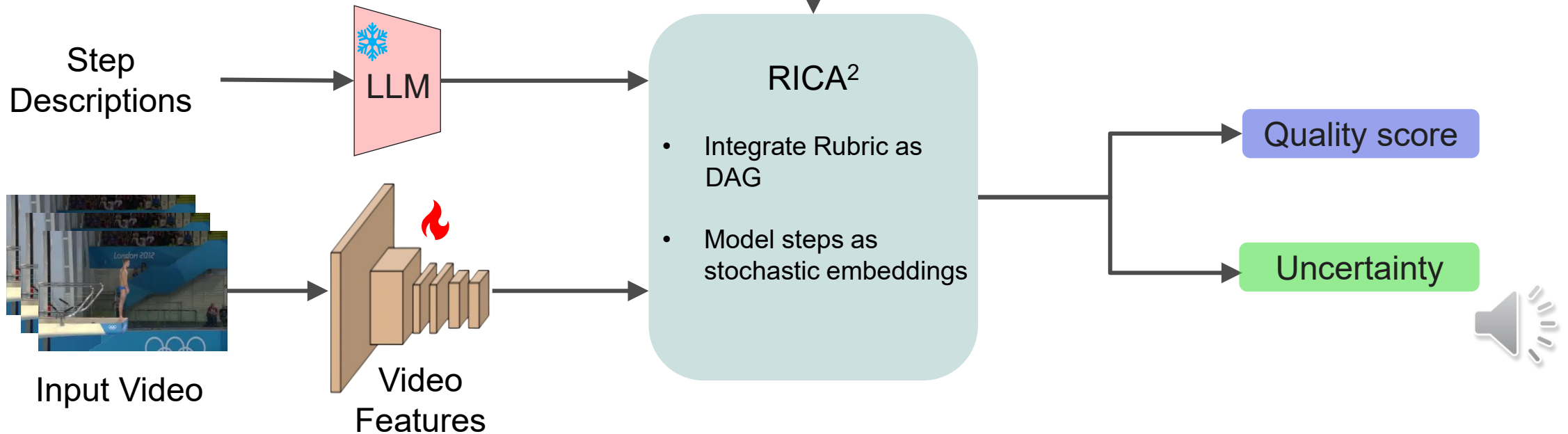
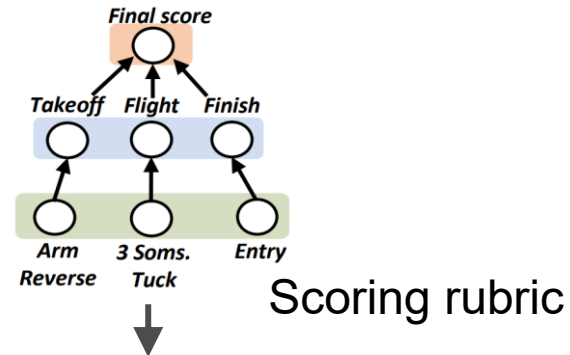
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Step descriptions

Forward: A diving technique involving a front-facing takeoff and entry

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Experiments and results



Datasets and Metrics

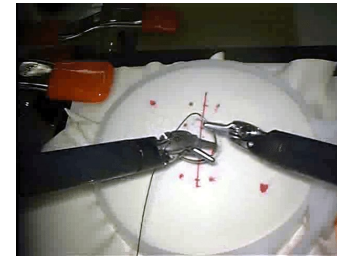
Datasets:



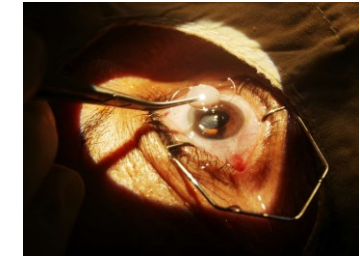
FineDiving



MTL-AQA



JIGSAWS



CATARACT-101

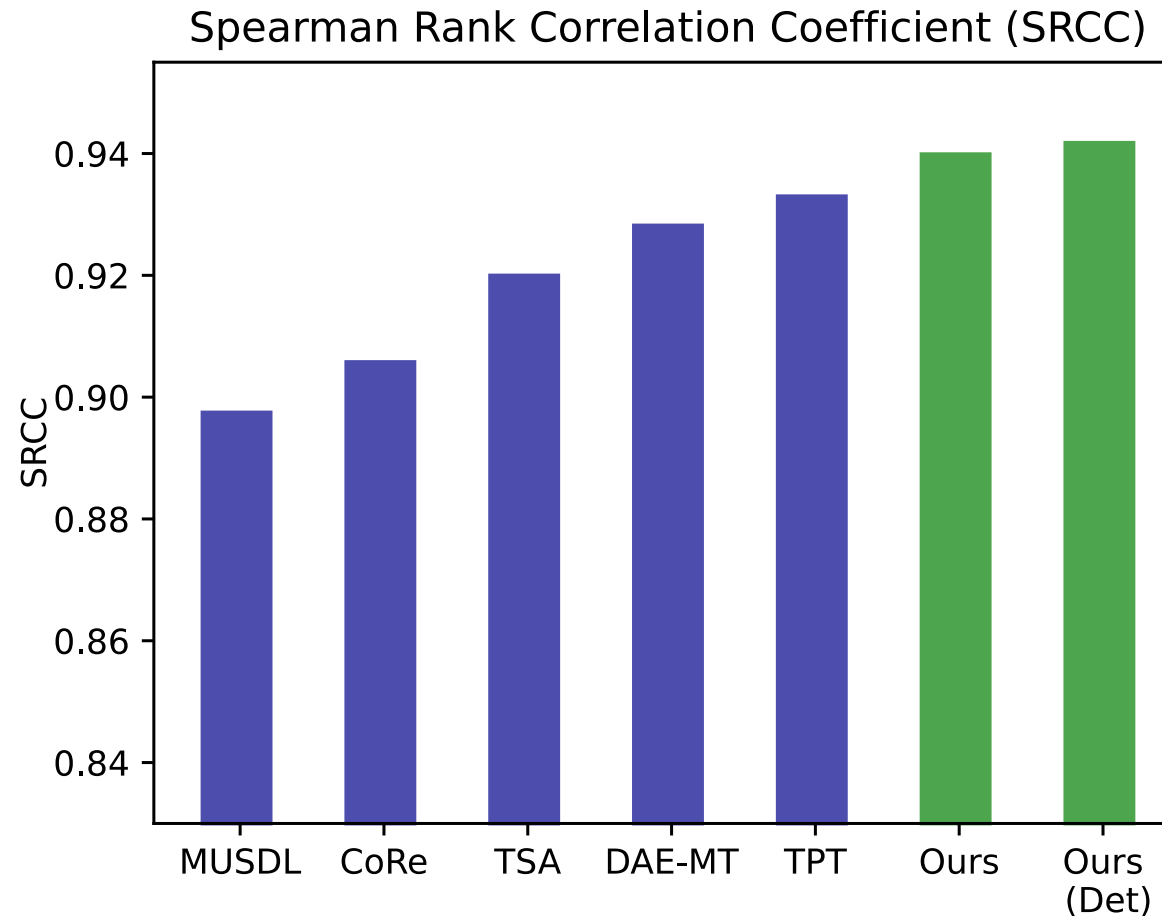
Metrics

- Accuracy metrics: Spearman Rank Correlation Coefficient (**SRCC**) and Relative L2 (**RL2**)
- Uncertainty calibration: **Kendall tau**



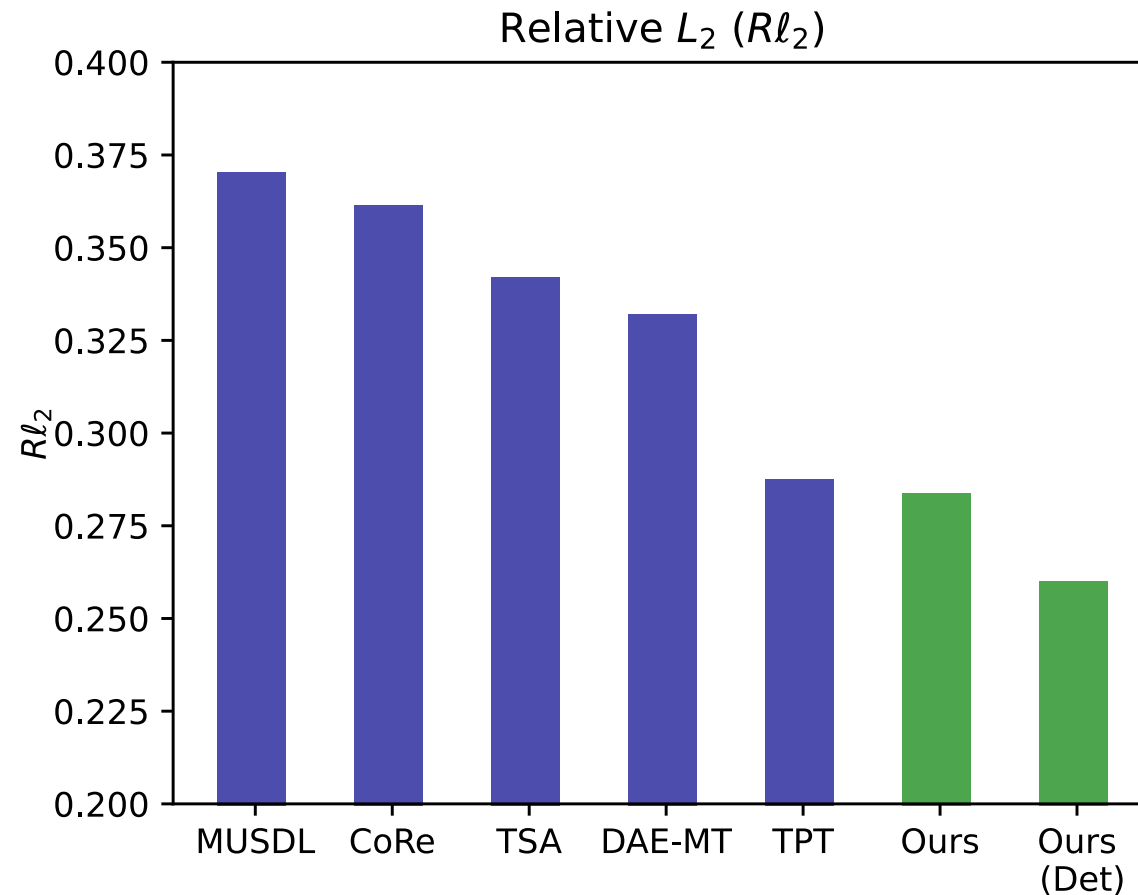
Accuracy Results on FineDiving

- State of the art performance on SRCC



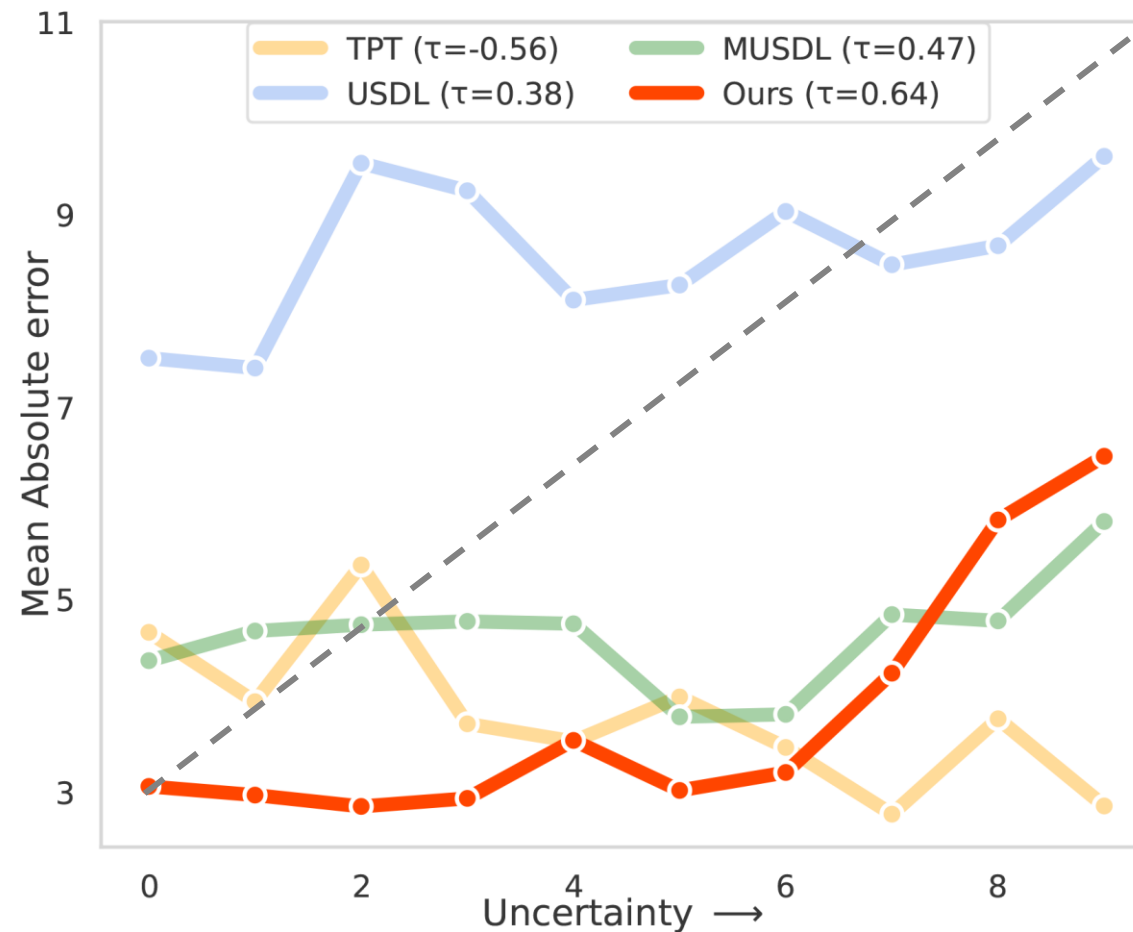
Accuracy Results on FineDiving

- State of the art performance on RL2



Uncertainty Calibration results on FineDiving

- Superior Uncertainty Calibration (τ)



Conclusion

We propose $RICA^2$: a deep probabilistic model for AQA

- Incorporates human scoring rubrics
- Provides calibrated uncertainty estimates
- Technical innovations are modeling the rubric as a DAG and stochastic embeddings to account for predication uncertainty
- Demonstrates state-of-the-art results on multiple benchmarks in terms of accuracy and calibration of uncertainty estimates

Poster details:

Session: 2

Board Number: 261



Project Page





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Thank you!

This work was supported by the UW Madison Office of the Vice Chancellor for Research with funding from the Wisconsin Alumni Research Foundation, by National Science Foundation under Grant No. CNS 2333491, and by the Army Research Lab under contract number W911NF-2020221.



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