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**INTERNATIONAL ORGANIZATION FOR STANDARDIZATION**

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**ISO/IEC JTC 1/SC 29/WG 2**

**MPEG TECHNICAL REQUIREMENTS**

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**Hannover, DE – October 2023**

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This document presents the results of the FCVCM Call for Proposals, providing a summary of the objective results obtained from the responses and status of the received responses. Based on the submitted results, it is recommended to proceed with a standardization project in a technical WG.

# Introduction

The CfP on Feature Compression for Video Coding for Machines [1], targeted at addressing requirements as detailed in [2]. There are 19 registered responses in total, while 12 responses have been submitted\*, which were studied at the 13th WG2 meeting. The technology submitted in the responses could be described in a two-stage pipeline, comprising a feature reduction stage and a feature coding stage.

\*Note: P05 and P09 are counted as one response.

Table 1 shows the categorization of responses regarding the use of training.

Table 1 Categorization of responses regarding the use of training

|  |  |  |  |
| --- | --- | --- | --- |
|  | Feature reduction stage | Coding stage | |
|  |  | Intra | Inter |
| Trained | 8 | 4 | 0 |
| Untrained | 4 | 7 | 9 |
| Both\* | 0 | 1 | 0 |
| Not applicable |  | 0 | 3 |

\* Includes both trained and untrained operation.

**Feature reduction stage**

* Eight used learned feature reduction methods (e.g., multi-scale feature fusion).
  + One also used spatial and temporal resampling methods
* Three responses used feature map truncation or grouping.

**Feature coding stage**

Table 2 shows a summary of the coding technology used in the responses for intra and inter coding operations.

Table 2. Response coding technology summary.

|  |  |  |
| --- | --- | --- |
|  | Intra coding | Inter coding |
| Non-learned (e.g., VVC) | 8 | 9 |
| End-to-end learned | 3 | 0 |
| Both | 1 | 0 |
| Not used | 0 | 3 |

# Results

Responses were evaluated on 3 tasks across 4 datasets. Averaged overall BD-rate gains are shown in the following tables. Table 3 shows the overall BD-rate gains of responses that passed crosscheck. Table 4 shows the overall BD-rate gains of responses that passed crosschecks aside from feature dump check.

Table 3. Results of responses that passed crosscheck

|  |  |  |
| --- | --- | --- |
| Proposal ID | Overall BD-Rate gain | |
| Feature anchor | Video anchor (informative) |
| P02 | -90.01% | -42.70% |
| P03 | -80.59% | 22.45% |
| P10 | -92.66% | -57.83% |

Table 4. Results of responses that passed crosscheck aside from feature dump check

|  |  |  |
| --- | --- | --- |
| Proposal ID | Overall BD-Rate gain | |
| Feature anchor | Video anchor (informative) |
| P04 | -94.34% | -67.87% |
| P13 | -94.56% | -69.00% |

# Acknowledgement of responding organizations

The following organizations are thanked for responding to the FCVCM CfP:

* Beihang University
* Canon
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* Kyung Hee University
* OP Solutions
* Sharp
* vivo
* Wuhan University
* Zhejiang University

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# Conclusion

Responses to the FCVCM CfP show technology that can achieve a substantial outperformance on feature compression than that achievable by state-of-the-art standardized technology, which is capable of meeting the requirements as specified in the FCVCM CfP. Thus, it is recommended to transfer this work into a Technical WG and establish a standardization project.

# References

1. “Call for Proposals on Feature Compression for Video Coding for Machines,” ISO/IEC JTC 1/SC 29/WG 2, N00308, Jul. 2023.
2. “Use cases and requirements for Video Coding for Machines”, ISO/IEC JTC 1/SC 29/WG 2 N00190, Apr. 2022.

# Appendix A CfP Errata

This appendix includes the CfP errata addressing the following issues found after the July 2023 (MPEG143) meeting:

1) Correction in the ‘Object\_Tracking’ worksheet.

2) Correction in the ‘CrossCheckSummary’ worksheet.

3) Correction in the ‘Object\_Detection’ worksheet.

4) Updates to runtime reporting for video datasets.

5) Correction to SFU dataset metric.