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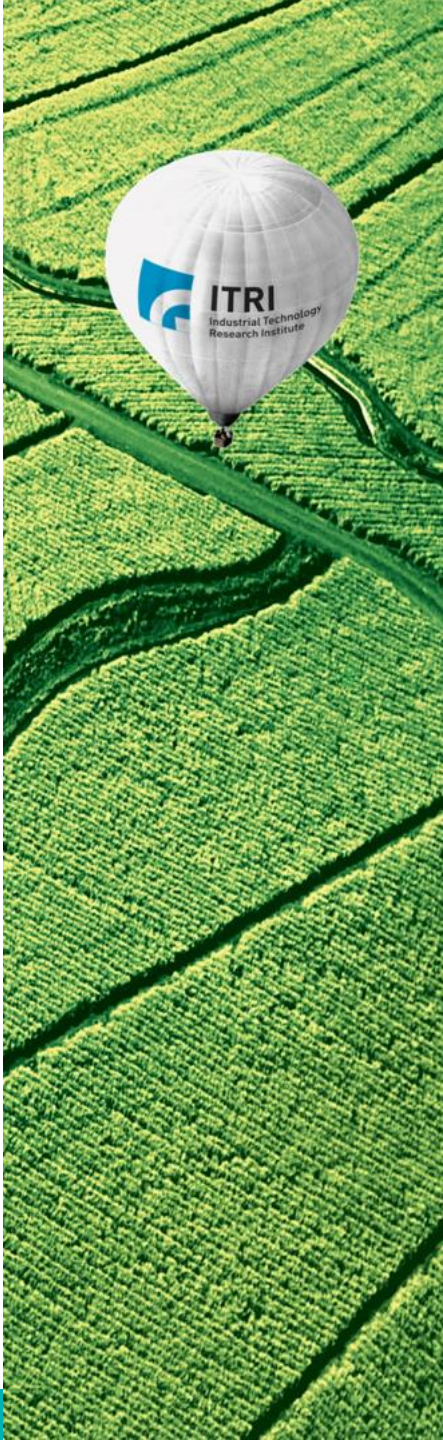
# 國際視訊標準資訊分享

王 聖 博 (ITRI)

26th November 2021

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# Outline

- H.266 status update
- 3D Graphics Coding (3DG)
- Video Coding for Machine

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# H.266 STATUS UPDATE

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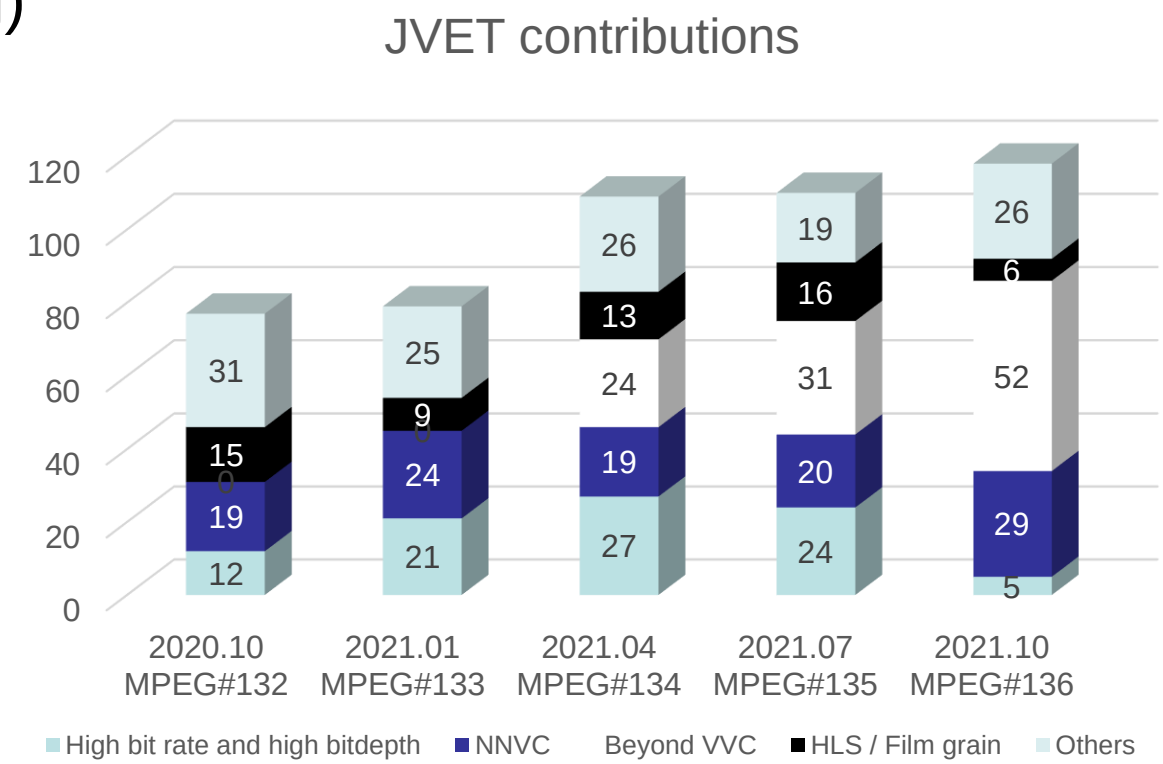
# Joint Video Expert Team (JVET)

- 24rd Meeting of JVET (6th Virtual meeting)
  - Date: 6–15 October 2021
  - Approximately 250 participants
  - Roughly 120 contributions
    - 5 high bit rate and high bit depth
    - 29 Neural network based video coding
    - 52 Enhanced compression beyond VVC capability
    - 6 High level syntax / Film grain synthesis
    - 26 Others

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# Activities

- CE: Film grain synthesis
  - CE discontinued, algorithms will be added to VTM software
  - Plan to develop a TR – new AHG
- EE1: Neural Network-based Video Coding
  - Main topics: enhancement filters (loop and post), super resolution, intra prediction
  - Further improve CTC for training and complexity assessment
  - Loop filter and intra prediction will also be tested on top of ECM developed under EE2
- EE2: Enhanced Compression beyond VVC capability
  - Main topics:
    - Partitioning: ABT, UBT, UQT
    - Intra prediction: MRL extension
    - Inter prediction: Combinations GPM inter/intra, affine improvements , modified merge list construction, TM improvements, MV sign prediction,
    - Transforms coding: Sign prediction improvements, adaptive MTS
    - Loop filter: Edge-based CCSAO, adaptive filter shapes for ALF

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# ECM-2.0 over ECM-1.0

| | All Intra Main 10 (Over ECM-1.0) | | | | |
|---|---|---|---|---|---|
| | Y | U | V | EncT | DecT |
| Class A1 | -1.04% | -1.43% | -2.23% | 140% | 109% |
| Class A2 | -1.01% | -2.27% | -0.94% | 139% | 113% |
| Class B | -0.97% | -3.01% | -3.99% | 137% | 116% |
| Class C | -0.72% | -1.49% | -1.62% | 133% | 123% |
| Class E | -1.10% | -2.01% | -2.79% | 131% | 119% |
| **Overall** | -0.96% | -2.12% | -2.46% | 136% | 116% |
| Class D | -0.88% | -1.53% | -1.07% | 132% | 128% |
| Class F | -0.55% | -1.97% | -2.33% | 114% | 110% |
| Class TGM | -1.08% | -1.61% | -1.63% | 110% | 103% |

| | Random Access Main 10 (Over ECM-1.0) | | | | |
|---|---|---|---|---|---|
| | Y | U | V | EncT | DecT |
| Class A1 | -1.45% | -3.15% | -5.45% | 123% | 111% |
| Class A2 | -1.07% | -3.59% | -2.70% | 120% | 107% |
| Class B | -1.07% | -5.84% | -6.26% | 131% | 114% |
| Class C | -1.26% | -3.64% | -3.56% | 132% | 117% |
| Class E | | | | | |
| **Overall** | -1.20% | -4.26% | -4.66% | 127% | 113% |
| Class D | -1.08% | -3.33% | -2.88% | 128% | 118% |
| Class F | -1.22% | -3.94% | -3.77% | 126% | 126% |
| Class TGM | -2.02% | -3.79% | -4.08% | 133% | 121% |

| | Low delay B Main 10 (Over ECM-1.0) | | | | |
|---|---|---|---|---|---|
| | Y | U | V | EncT | DecT |
| Class A1 | | | | | |
| Class A2 | | | | | |
| Class B | -0.86% | -12.85% | -12.12% | 127% | 114% |
| Class C | -0.87% | -7.38% | -6.20% | 130% | 113% |
| Class E | -1.46% | -4.02% | -6.78% | 133% | 123% |
| **Overall** | -1.01% | -8.82% | -8.81% | 130% | 116% |
| Class D | -0.66% | -6.60% | -5.70% | 125% | 113% |

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# ECM-2.0 over VTM-11.0

| | All Intra Main 10 (Over VTM-11.0 + V0056) | | | | |
|---|---|---|---|---|---|
| | Y | U | V | EncT | DecT |
| Class A1 | -6.76% | -10.85% | -12.55% | 306% | 235% |
| Class A2 | -6.43% | -9.83% | -6.78% | 294% | 226% |
| Class B | -5.92% | -9.95% | -11.25% | 337% | 248% |
| Class C | -6.73% | -8.79% | -9.19% | 329% | 243% |
| Class E | -7.23% | -9.70% | -9.20% | 329% | 286% |
| **Overall** | -6.54% | -9.78% | -9.92% | 321% | 247% |
| Class D | -5.70% | -7.02% | -6.59% | 332% | 256% |
| Class F | -10.50% | -13.32% | -14.04% | 244% | 285% |
| Class TGM | -15.50% | -17.44% | -17.29% | 233% | 290% |

| | Random Access Main 10 (Over VTM-11.0 + V0056) | | | | |
|---|---|---|---|---|---|
| | Y | U | V | EncT | DecT |
| Class A1 | -13.50% | -15.91% | -20.31% | 342% | 504% |
| Class A2 | -14.37% | -17.39% | -16.47% | 321% | 584% |
| Class B | -12.47% | -17.52% | -17.43% | 355% | 548% |
| Class C | -14.37% | -16.46% | -16.52% | 351% | 488% |
| Class E | | | | | |
| **Overall** | -13.56% | -16.89% | -17.57% | 345% | 529% |
| Class D | -15.35% | -16.36% | -15.88% | 358% | 530% |
| Class F | -13.20% | -16.71% | -16.88% | 319% | 438% |
| Class TGM | -14.41% | -17.97% | -18.41% | 325% | 307% |

| | Low delay B Main 10 (Over VTM-11.0 + V0056) | | | | |
|---|---|---|---|---|---|
| | Y | U | V | EncT | DecT |
| Class A1 | | | | | |
| Class A2 | | | | | |
| Class B | -10.33% | -21.17% | -20.57% | 301% | 326% |
| Class C | -11.78% | -16.02% | -16.53% | 326% | 286% |
| Class E | -10.56% | -13.79% | -14.32% | 266% | 296% |
| **Overall** | -10.87% | -17.61% | -17.66% | 300% | 305% |
| Class D | -13.96% | -17.39% | -17.06% | 321% | 298% |

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# AHGs for 24th JVET Meeting

- Project Management (AHG1) *
- Draft text and test model algorithm description editing (AHG2) *
- Test model software development (AHG3) *
- Test material and visual assessment (AHG4) *
- Conformance testing (AHG5)
- ECM software development (AHG6)
- ~~Coding of HDR/WCG material (AHG7)~~
- Low latency and constrained complexity (AHG7) - new
- High bit-depth, high bit rate and high frame rate coding (AHG8)
- SEI message studies (AHG9) *
- Encoding algorithm optimizations (AHG10)
- Neural-network-based video coding (AHG11)
- Enhanced compression beyond VVC capability (AHG12)
- Film grain technologies (AHG13) - new

* merge JVET and JCT-VC

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# 3D GRAPHICS CODING (3DG)

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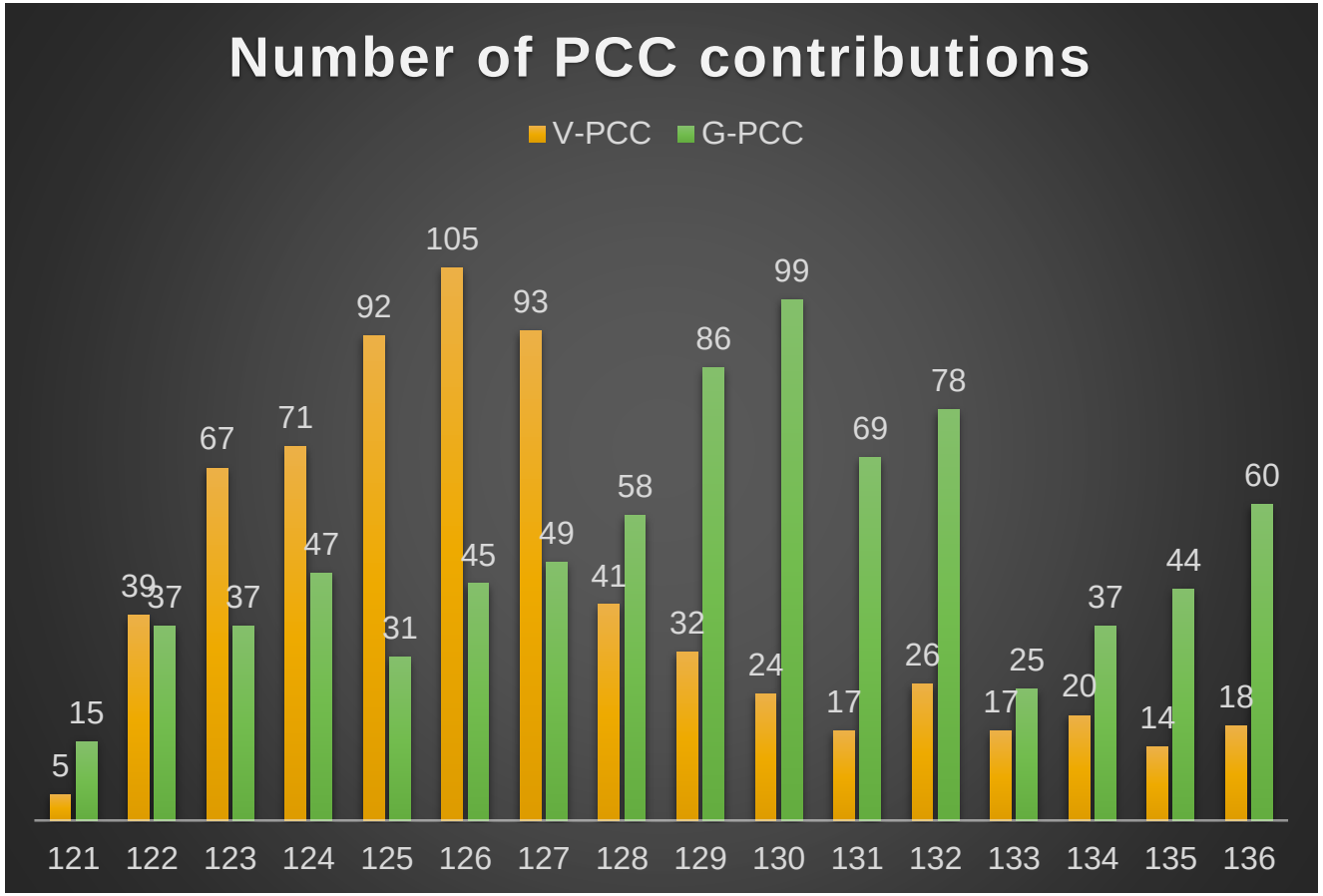
# PCC meeting

- Point Cloud Compression
  - ISO/IEC 23090-5 and -9
  - ISO/IEC 23090-19, -20, -21, -22

- Approximately 60+ participants

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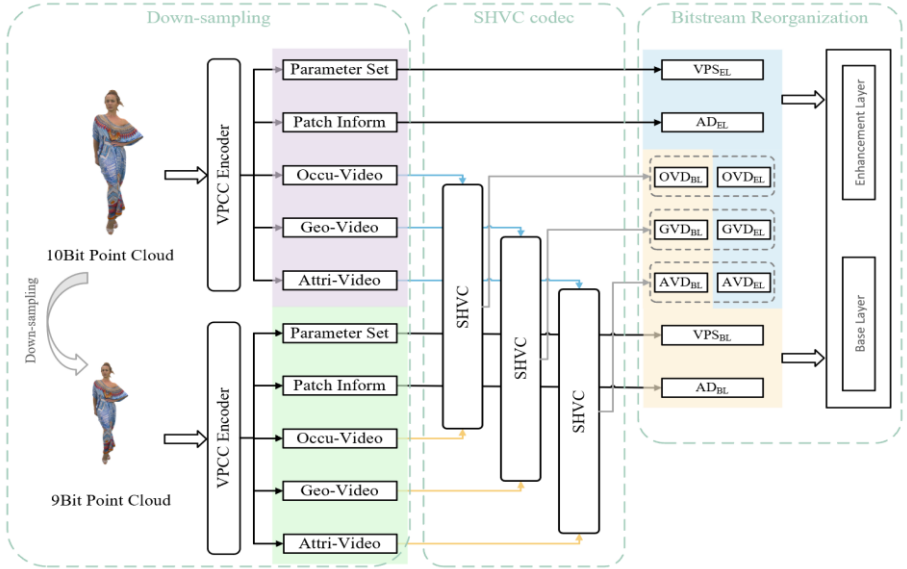
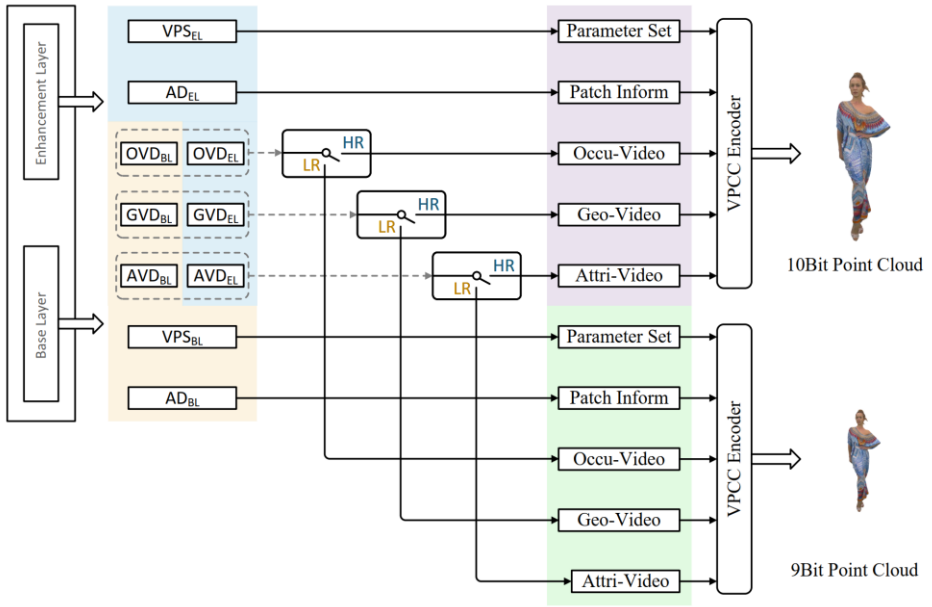
# V-PCC main topics

- Video codec evaluations for V-PCC
  - Occupancy map based RDO, 3DME, spatially scalable V-PCC
  - Coding performance of VVC coding tools for V-PCC
    - Best practice: Disabling the deblocking filter and GOP-based temporal filter for geometry
  - Spatially Scalable Video-Based Point Cloud Compression

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# Dynamic Mesh Coding

- **CfP issued**
  - Content: Only one category (texture mapping)
  - Anchors: MPEG AFX (lossless) and Draco (lossy)
  - Timeline
    - 2021.10 Release CfP
    - 2022.04 Review CfP
    - 2022.07 Establish first test model
    - 2023.04 Approval of CD
    - 2024.01 Approval of DIS
    - 2024.10 Approval of FDIS

Image based Mesh metric

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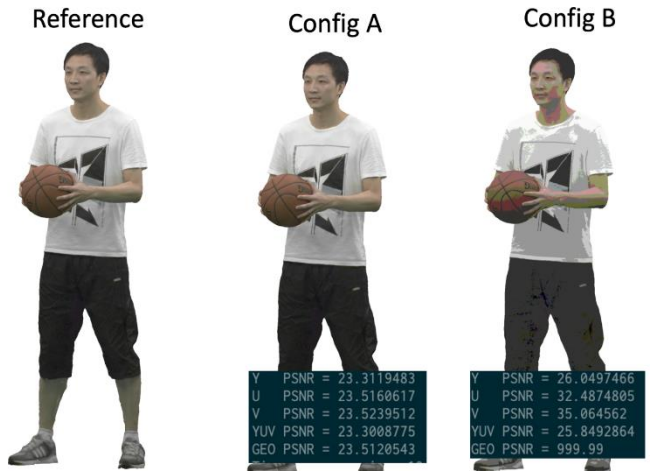
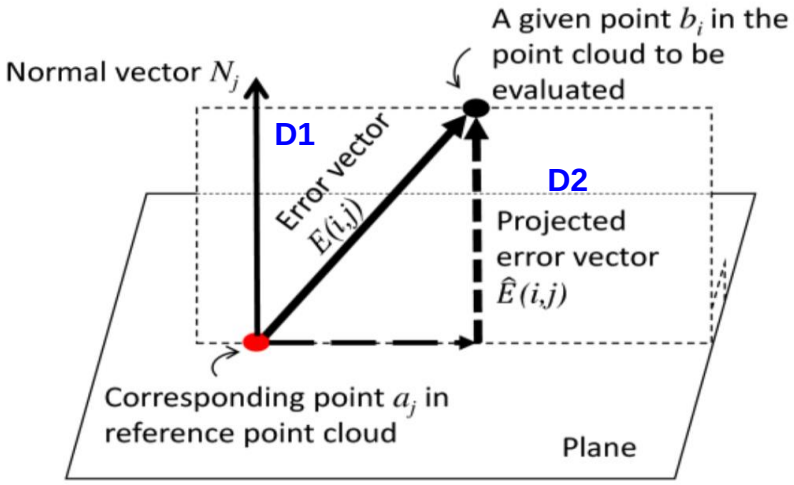
# Dynamic Mesh Coding

– Metrics:
  - Point-based metric (primary)
  - Image based Mesh metric (informative)
    – Disadvantages: corner cases




Point-based metric

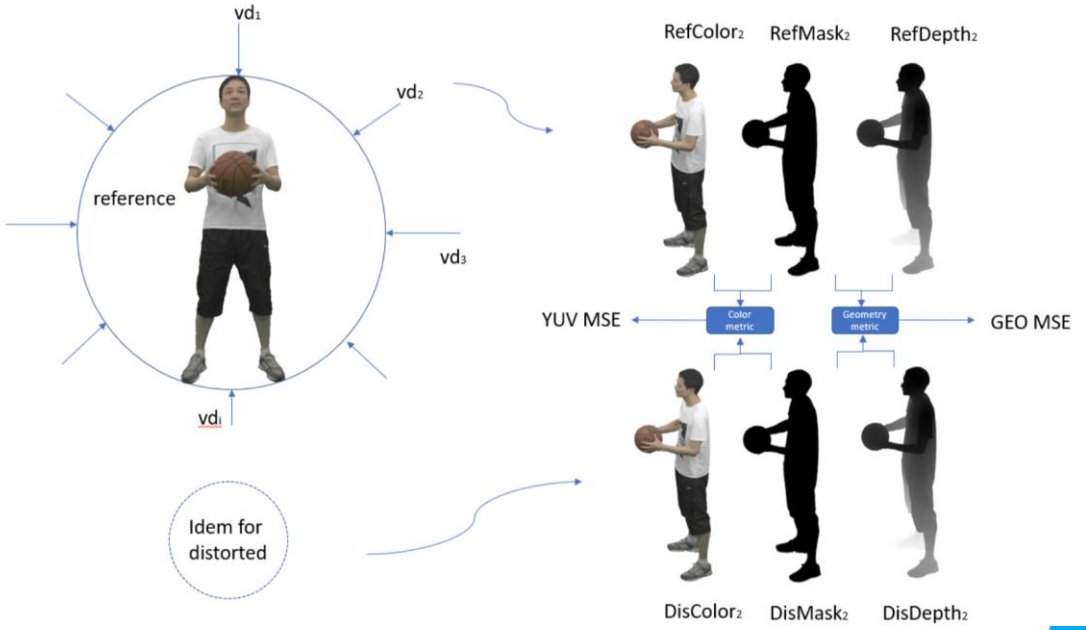



Image based Mesh metric

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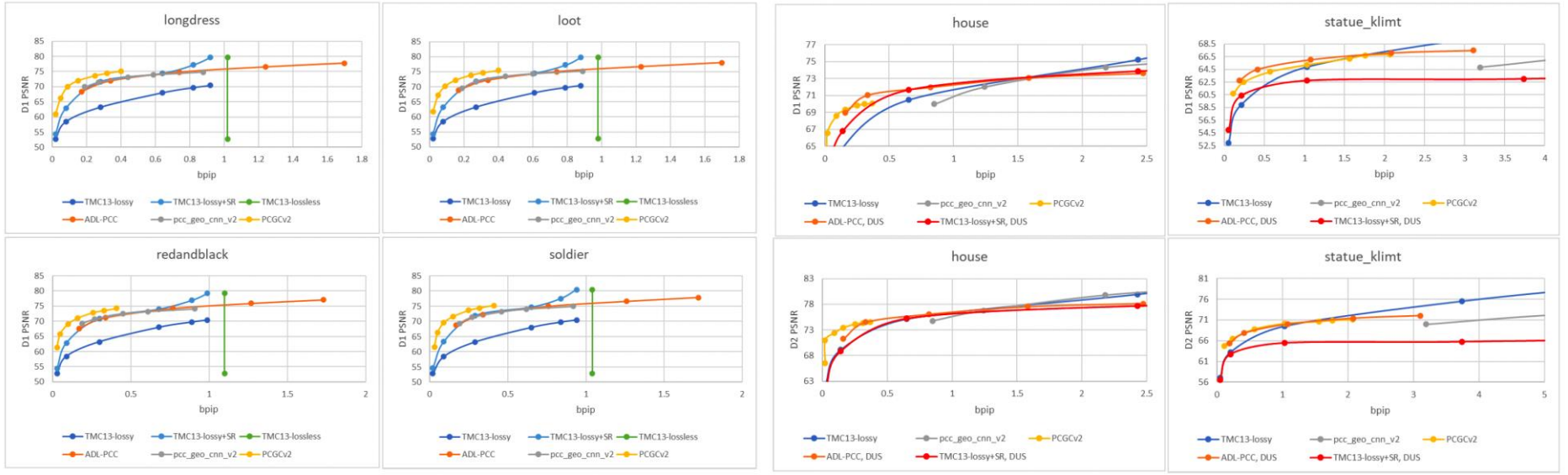
# G-PCC main topics

- AI technologies for point clouds coding
  - Geometry only, relatively complex (processing and memory)
  - Improving the coding of neighbour-based occupancy of octree in GPCC
  - Next steps
    - Guidelines for conducting AI exploration experiments for PCC
    - Performance analysis of currently AI-based available solutions for PCC
    - Analyze and collect relevant dataset for AI based PCC



# Video coding for machine

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# Status and progress

- Main topics in VCM
  - EE1 End-to-end Learning-based Compression for Machine Vision Tasks
  - EE2 feature compression for VCM
  - EE3 Evaluation of video coding technologies for multiple tasks with hybrid vision
  - EE4 Descriptor based VCM for multi-task
- Split into two tracks in October 2021
  - Track 1: Feature extraction and compression tasks
    - Draft CfE: April 2022. CfE: July 2022.
  - Track 2: Image and video compression tasks
    - Draft CfP: January 2022.  CfP: April 2022.
- Studying the generalization of cross task performance and different architectures of task-NNs
- Adding lightweight NNs in the EE

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# Thank You


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