PERFORMANCE EVALUATION OF EXISTING QUALITY MODELS AND ITU STANDARDS ON VIDEO GAMING QUALITY ESTIMATION

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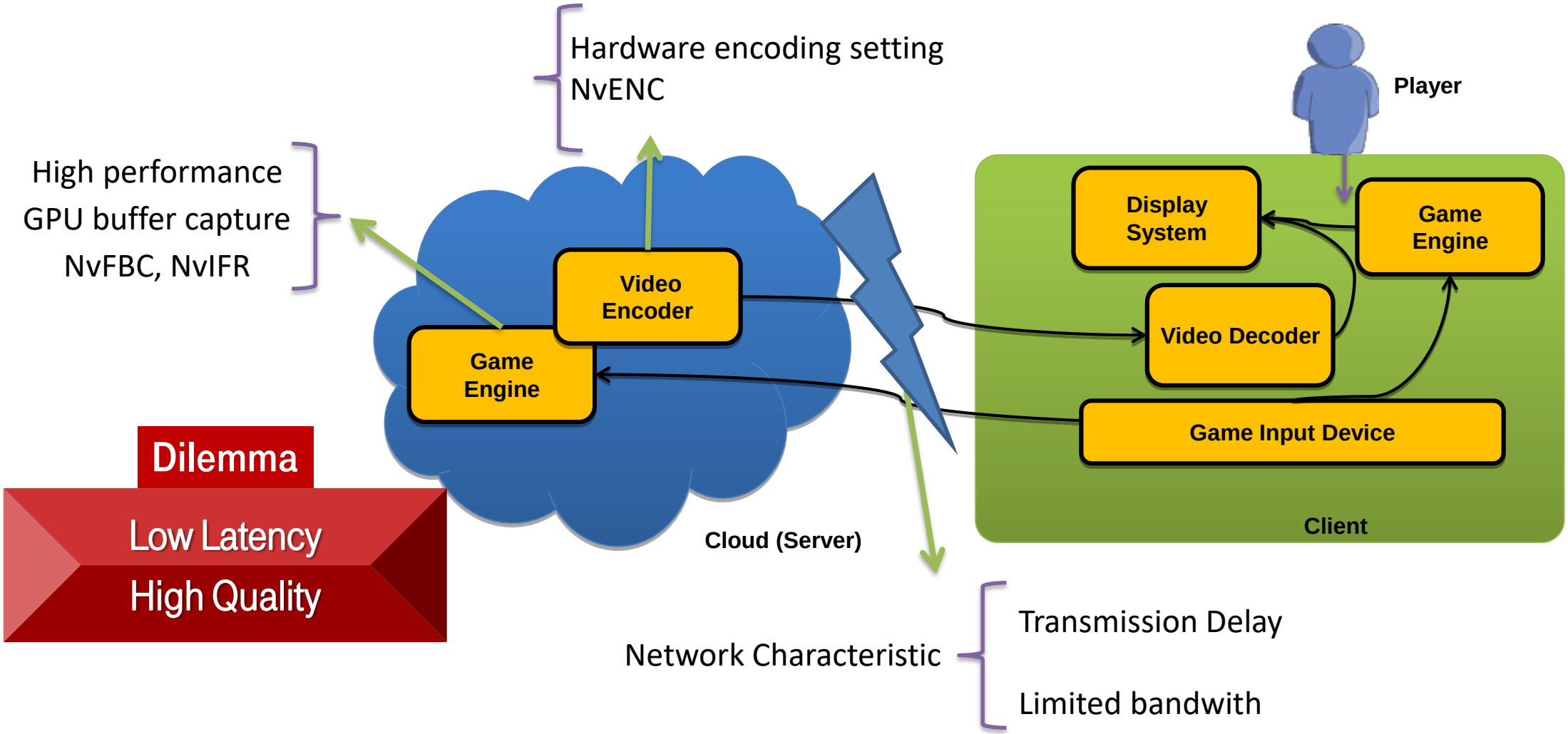
CLOUD GAMING

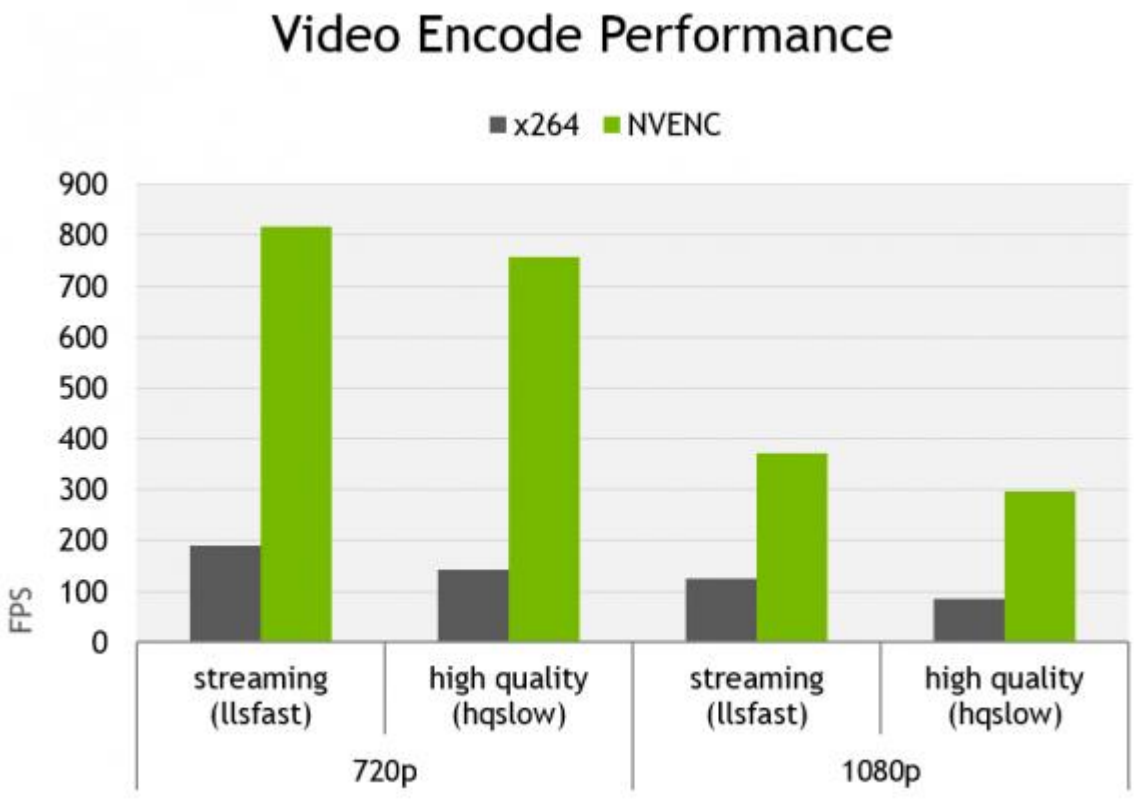
Special encoding and network protocol

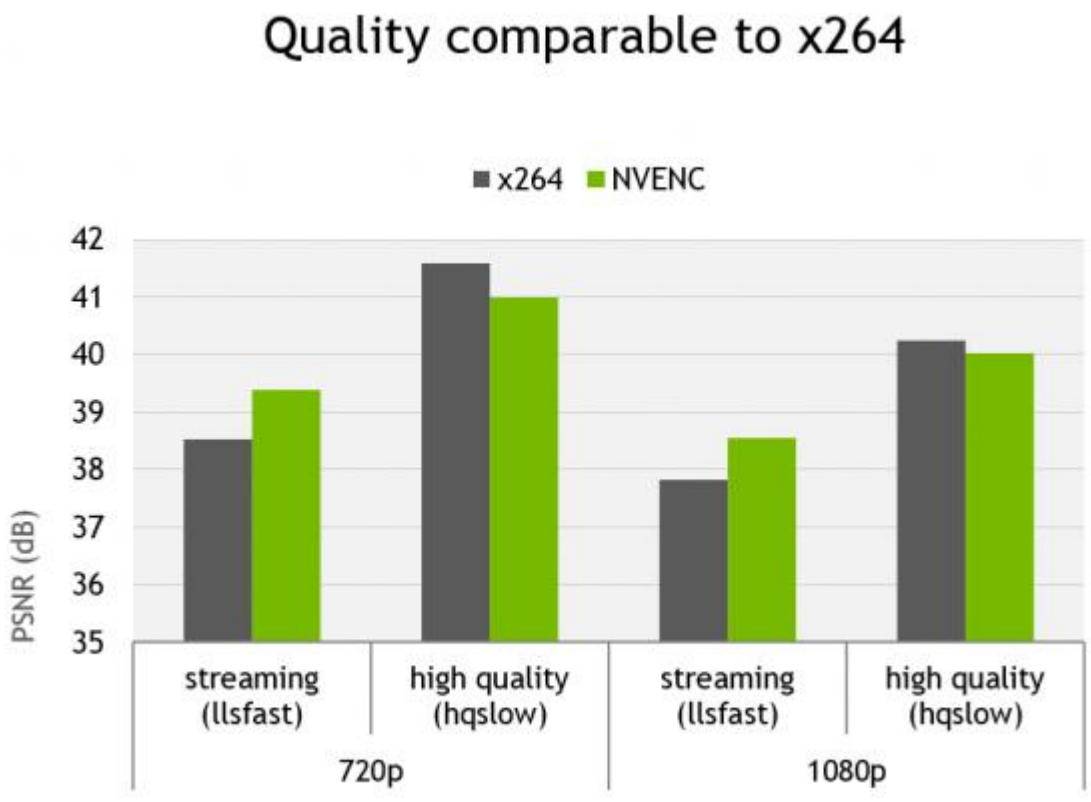
- **Latency**
  - Capturing RGB data from frame buffer (front buffer) without any involvement from OpenGL/Direct3D
  - Using GPU hardware accelerator engines for video encoding/decoding
  - Fixed macroblock size for fast encoding
- **Packet loss (concealment)**
  - Designing task-specific network protocol such as reliable UDP
- **Encoding setting**
  - CBR, short GoP, ...

CLOUD GAMING



HW VS SW ENCODING





Taken from https://developer.nvidia.com/nvidia-video-codec-sdk

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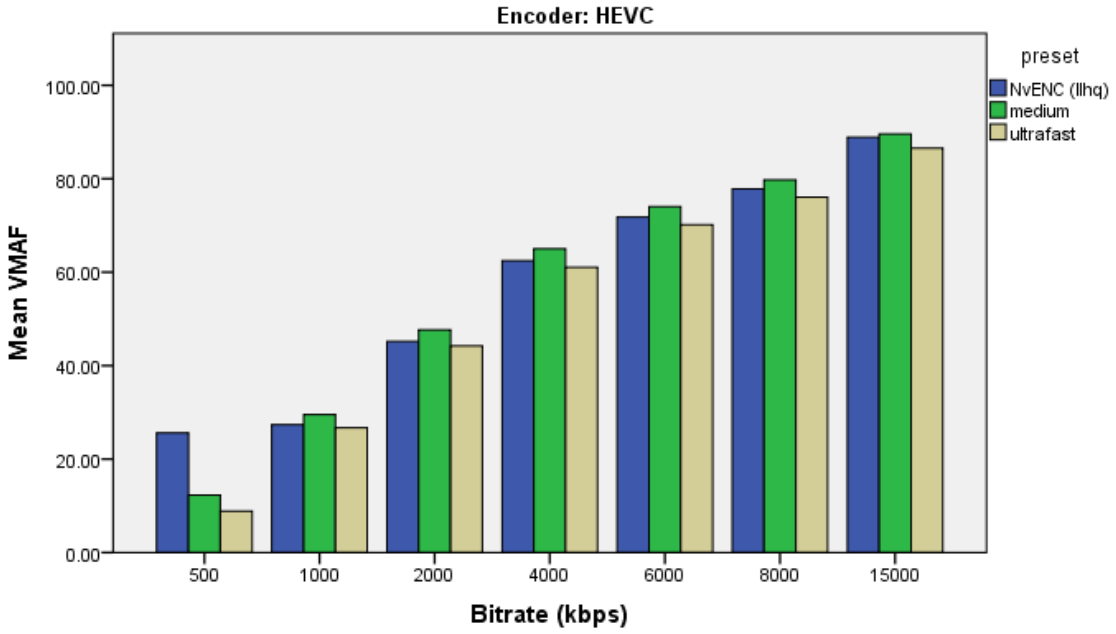
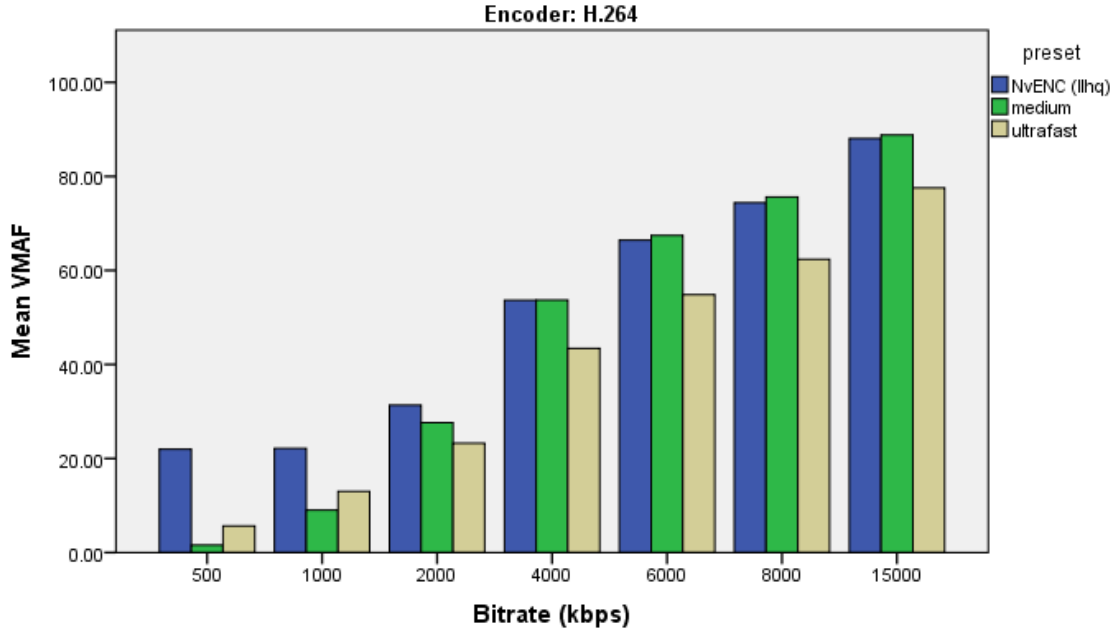


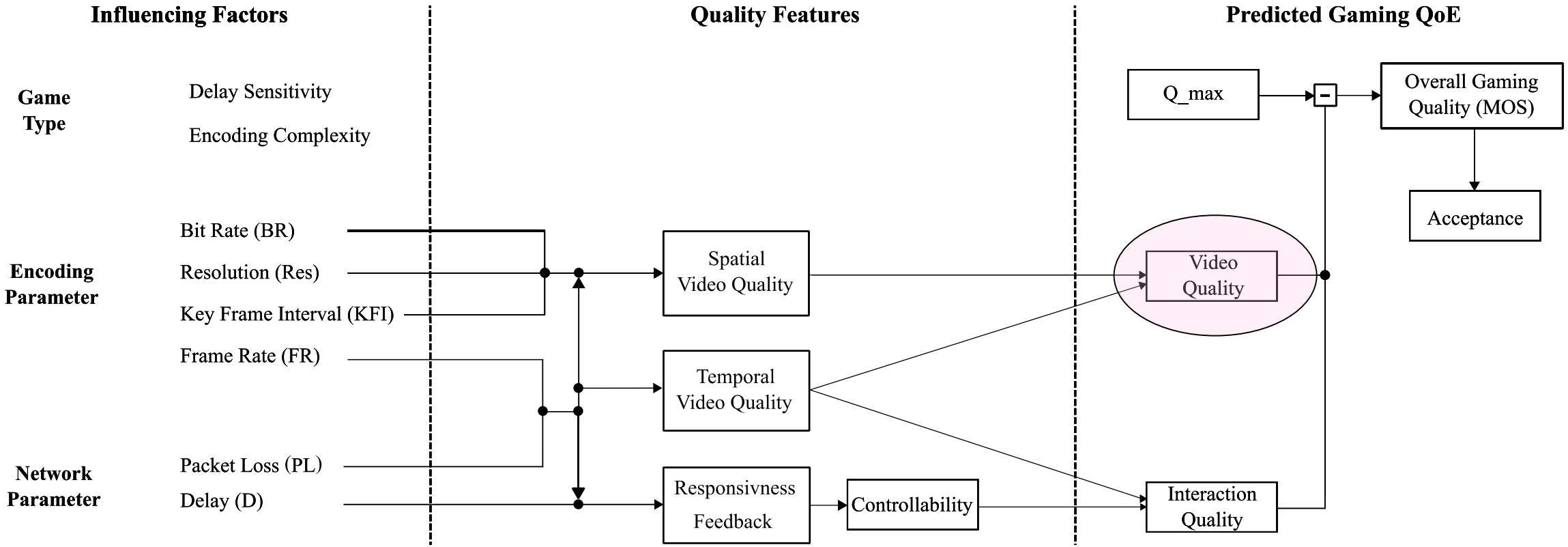


The result for a complex video game: Nier Automata

Medium preset of x264 performs quite similar to llhq preset of NvENC

G.OMG MODEL

Opinion model for gaming



PLANNED ACITIVITIES

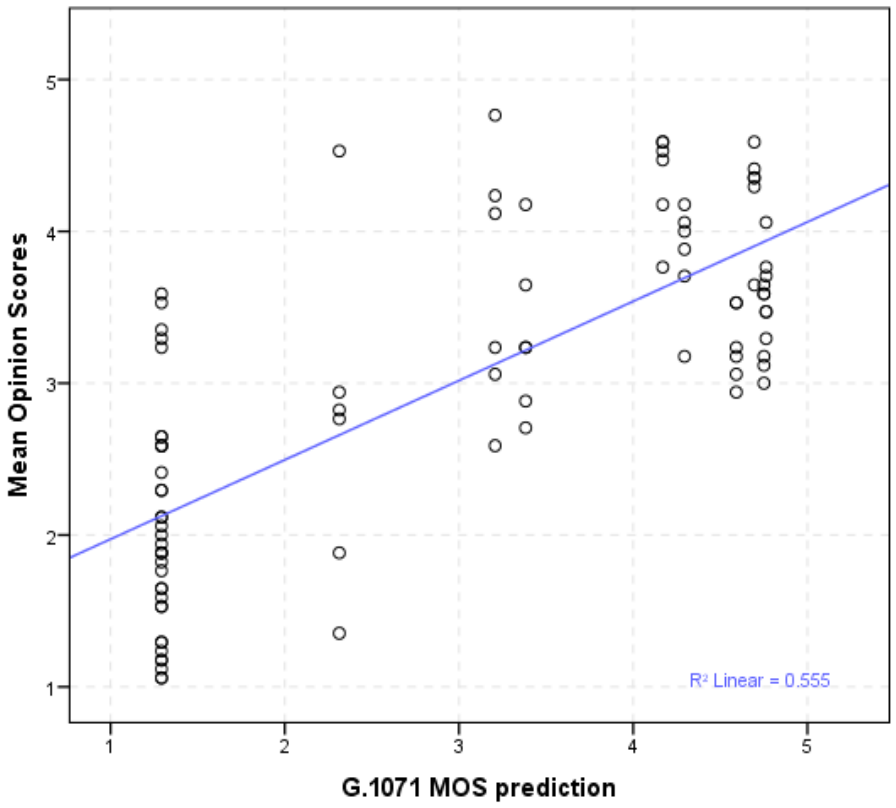
Modeling Gaming QoE

- **Planning model**
  - G.1071: Opinion model for network planning of video and audio streaming applications
- **Monitoring models**
  - P.1201: Parametric non-intrusive assessment of audiovisual media streaming quality
  - P.1203: Parametric bitstream-based quality assessment of progressive download and adaptive audiovisual streaming services over reliable transport

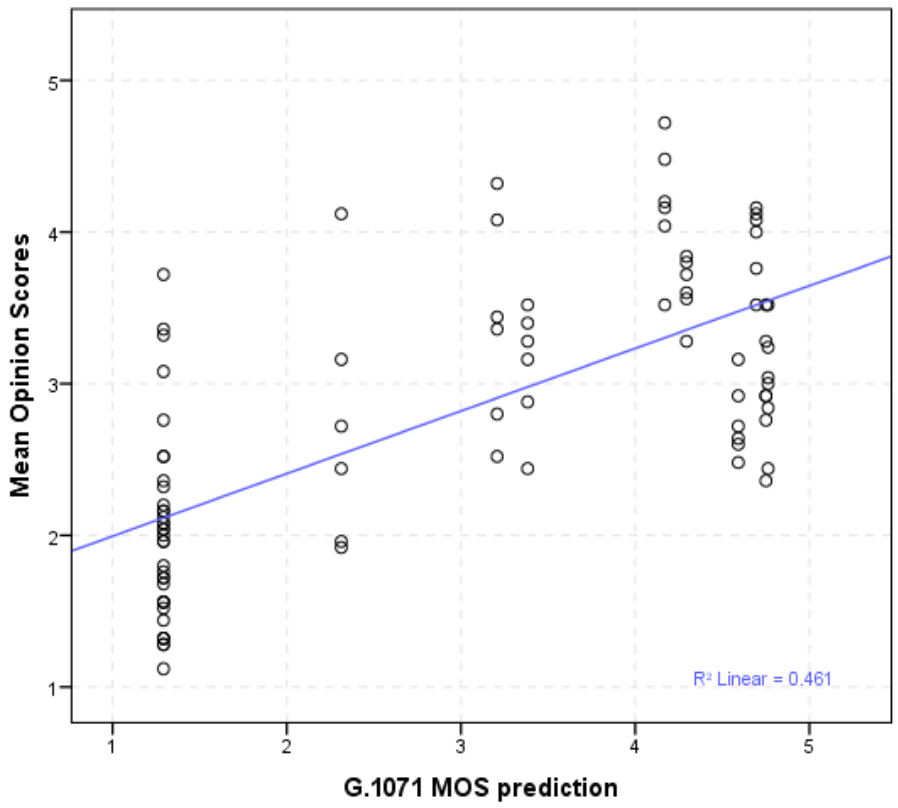
G.1071 ON VIDEO GAMES

Planning Video Gaming Model

GamingVideoDataset

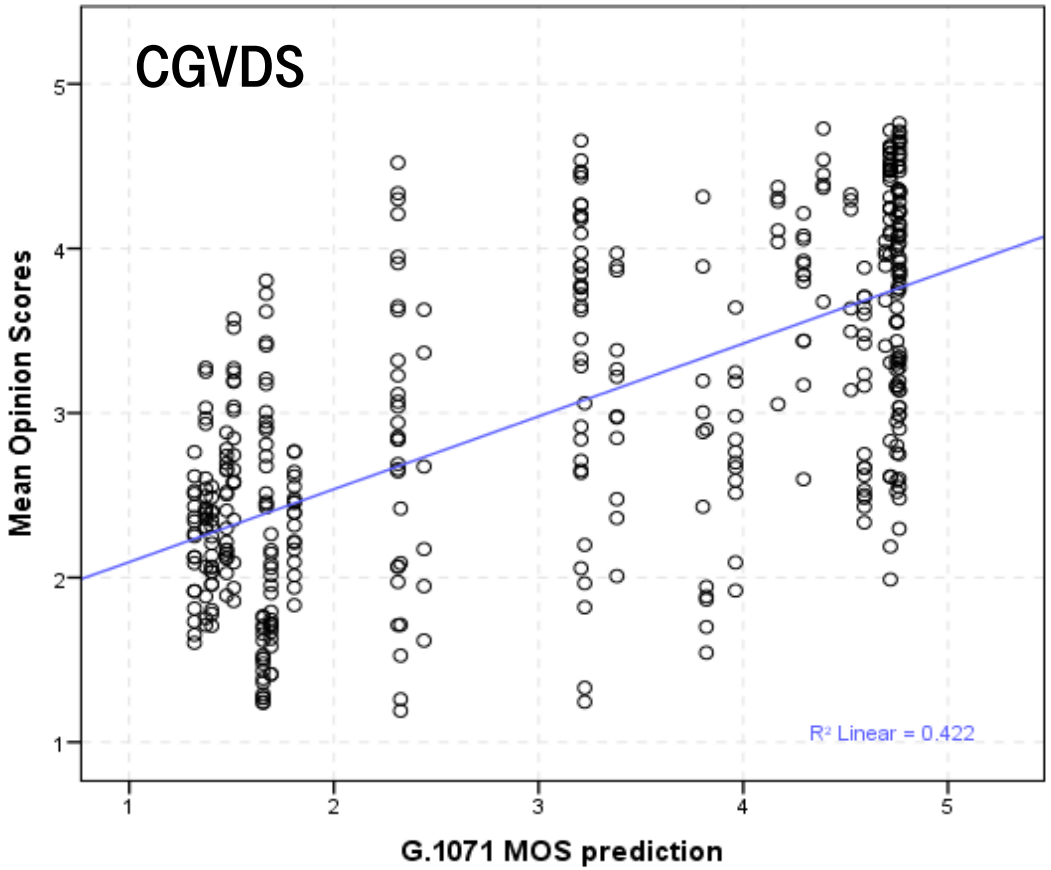


KUGVD



G.1071 ON VIDEO GAMES

Planning Video Gaming Model

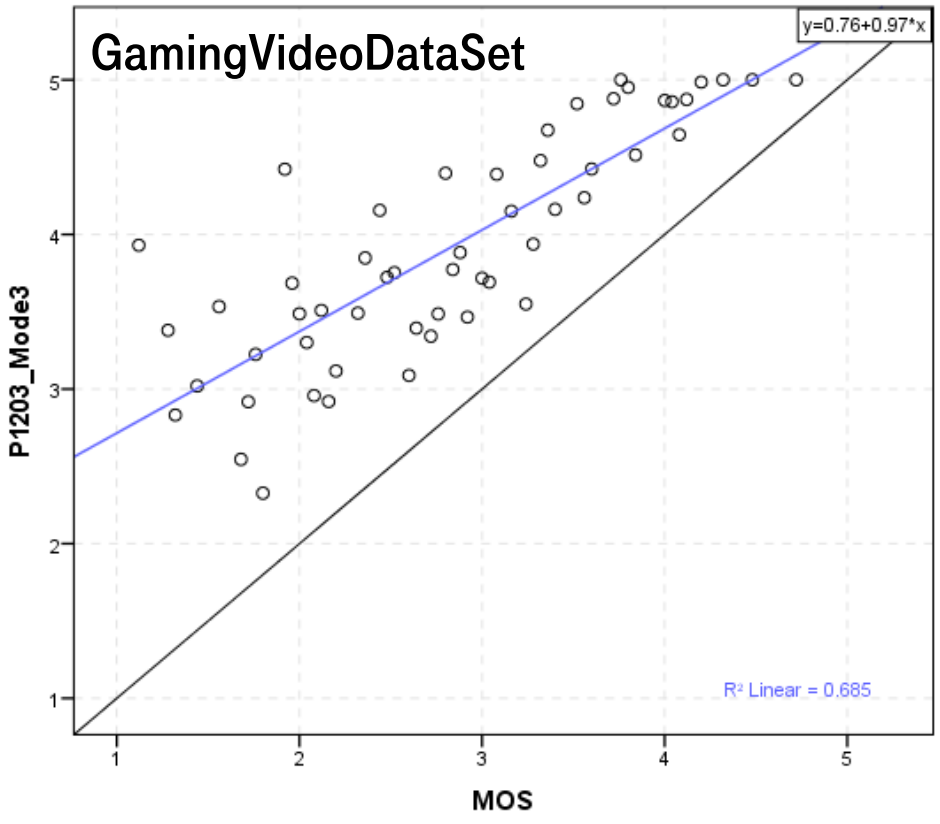


GamingVideoDataSet		KUGVD		CGVDS	
Correlation	RMSE	Correlation	RMSE	Correlation	RMSE
0,68	1.1	0,74	0.99	0.65	1.05

RESULTS OF P.1203

Parametric bitstream-based quality assessment of progressive download and adaptive audiovisual streaming services over reliable transport

Mode	Encryption	Input	Complexity
0	Encrypted media payload and media frame headers	Meta-data	Low
1	Encrypted media payload	Meta-data and frame size/type information	Low
2	No encryption	Meta-data and up-to 2% of the media stream	Medium
3	No encryption	Meta-data and any information from the video stream	Unlimited



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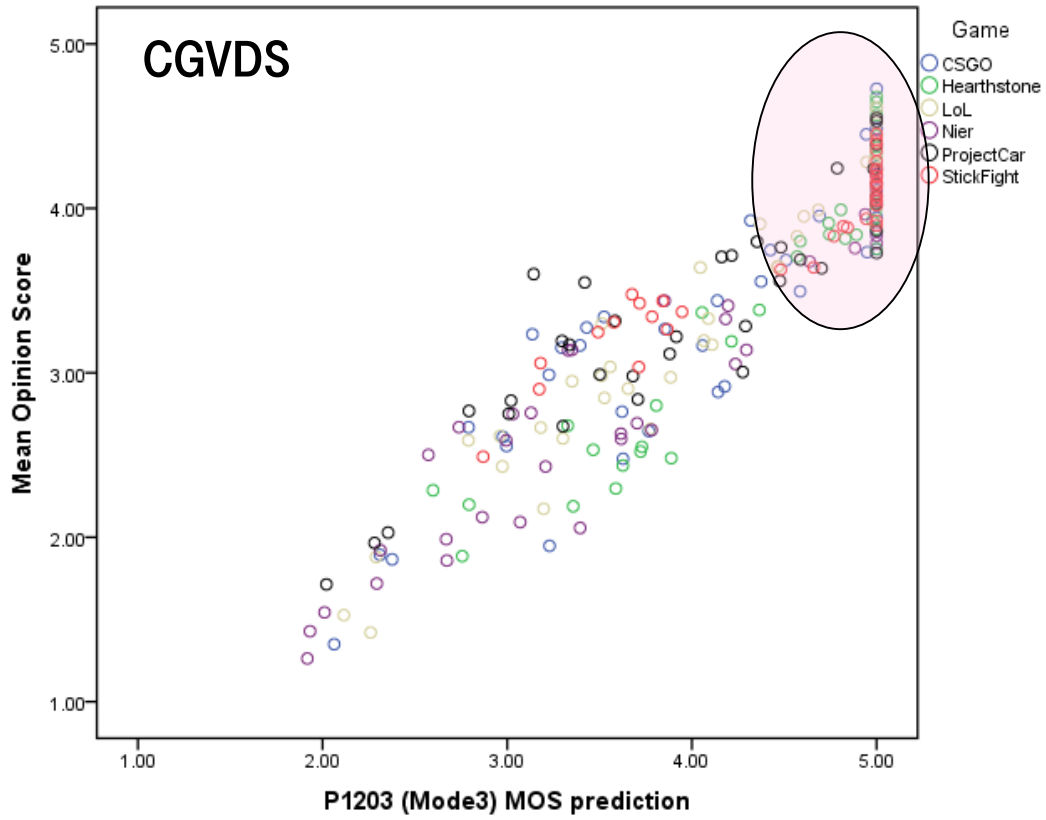

G.OMG VIDEO QUALITY

Updating G.1071 based on gaming content

- **Fit the model again based on our dataset**
  - Only a few coefficient changed dramaticly
- **The change of performance based on the new dataset**
- SRCC: 0.63 → 0.735
- RMSE: 1.05 → 0.754

Coefficient	old		new
a_{1V}	51.28	→	283.88
a_{2V}	−22.00	→	−21.85
a_{3V}	6.00	→	20.93
a_{4V}	6.21	→	4.84
a_{31}	3.92	→	−12.46
a_{32}	−27.54	→	−23.34
a_{33}	0.26	→	0.84
c_{1V}	17.73	→	62.85
c_{2V}	123.08	→	1399.50
c_{21}	80.61	→	49.78
c_{22}	0.000 46	→	0.000 46
c_{23}	0.001 47	→	0.014 17
q_1	0.018	→	0.204
q_2	0.040 00	→	0.000 25

CONCLUSION

- **Gaming content is diverse in terms of video complexity**
  - A video game classification is required in order to obtain an accurate video game model
- **G.OMG**
  - Updating G.1071 for gaming content might be a candidate for video quality module
  - We plan to extend our dataset to cover wide range parameters
- **P.1203 phase 2**
  - Recommend to use gaming content in training and especially high complex video games as they might be much more complex than non-gaming videos

Thank you for your attention!

CONTACT

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