Dolby Laboratories: Advanced Technology Group Info Session
Agenda

Intro to Dolby
Dolby Sound Technologies
Dolby Image Technologies
Dolby Network Coding Technologies
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30+ CITIES
20+ COUNTRIES
2300+ PEOPLE
Enabling the Entertainment Ecosystem
Agenda

Intro to Dolby

Dolby Sound Technologies
Dolby Image Technologies
Dolby Network Coding Technologies
Sound Areas of Interest

- Deep Learning for audio applications
  - Source separation
  - Classification
  - Generative audio
- Multi-modal analytics (audio/video/etc.)
- Audio capture
- Audio coding
- Audio processing

- Data analytics
- Audio rendering (headphones, speakers)
- Game engines
- Virtual Reality
- Augmented Reality
- Immersive experiences
- Human perception
- Objective quality metrics
DEEP LEARNING FOR AUDIO APPLICATIONS

- Source Separation
- Classification
- Generative Audio
MULTIMODAL ANALYTICS

- Multi-Modality
- Text/Audio/Video
- Explore correlation
- Analysis
- Representation
- Generation
- Processing
**AUDIO CAPTURE**

- Orchestrated capture
- Distributed processing
- Geometric inference
- Room acoustics

- Spatial audio capture
  - Novel microphone array topologies
  - Higher Order Ambisonics
  - Dolby Atmos content workflow
Audio Processing

Input Audio Signal → Audio Signal Processing System → Processed Audio Signal

Meta data
DATA ANALYTICS

• Understanding algorithm performance
• Measuring consumer engagement
• Improving performance and engagement
AUDIO RENDERING

• Speakers
• Smart speakers
• Headphones
GAME ENGINES

• Immersive Gaming
• Immersive audio for AR/VR/XR
IMMERSIVE EXPERIENCES

• Next Generation Immersive Experiences
• Entertainment
• Virtual Acoustics
HUMAN PERCEPTION

- Psychoacoustics
- Cognition
OBJECTIVE QUALITY METRICS

• Machine-based Audio Quality Assessment
• Faster than Subjective Testing
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SDR => Dolby Vision: High Dynamic Range (HDR) & Wide Color (WCG)

Standard Dynamic Range (SDR) = Dynamic Range of 0-100 nits & Rec-709 Color Gamut

Dolby Vision is an end-to-end ecosystem: from content creation, to distribution, to consumption = Dynamic Range of 0-10000 nits & Rec-2020 Color Gamut
MORE DYNAMIC RANGE
Dolby Vision Partnership Momentum

15+ TOP TV BRANDS
with Dolby Vision, available at all price points

15+ GLOBAL CONSUMER BRANDS ASIDE FROM TV
supporting Dolby Vision playback across device types

10+ STREAMING SERVICES
delivering Dolby Vision content

16000+ DOLBY VISION TITLES
released for the home
Areas of Interest for Imaging

Dolby Vision/HDR Capture
Higher-Order Image Capture and Processing
Novel Capture Systems and Processing
Deep Learning based Image/Video Processing
Image/Video Restoration
HDR Still Image Compression and Processing
Human Machine Interface
Volumetric Immersive Experiences (AR/VR)

Deep learning Video Compression
3D Scene Representation & Processing
Multimodal Representation and Processing
Vision and Psychophysics
Human Perception
Video Quality Metrics
AR/VR Displays/Imaging Hardware
Personalization/Privacy/etc
Higher Order Image Capture + Processing

• Multi-spectral and hyper-spectral capture, processing
• Novel image signal representations
• Improved accuracy color transforms
• New 3A architectures and algorithms

Image I

λ₀

pR
qG

Σ = + +

2-D LUT

Color Correction LUT

R, G, B = unscaled output color

Sigma = input scale factor
p, q = input chromaticity

Σ = R₀ + G₀ + B₀
p = R₀ / Σ
q = G₀ / Σ

apply scale factor

Rout
Gout
Bout
Novel Capture Systems + Processing

• Under-display cameras
• Event cameras
• New sensor architectures (dynamic range, frame rate)

Figure 1. UDC panel area according to usage


IEEE Spectrum, 20 Feb 2020
Deep Learning Video Processing

• Video Restoration and Video Enhancement
• Photo/Video Immersive Experience
Human Machine Interface

• Enable interactivity and immersion
• Computer vision/sound understanding
• Camera, microphone, and sensor
Volumetric Immersive eXperiences

- Volumetric Capture
- Novel postproduction techniques
- Scene analysis
- Real time high frame rate novel view synthesis
- Volumetric codecs
- VR and AR HMD research
- Novel camera and display panel research
Deep Learning Video Compression

- Hybrid Approach
- End-to-end Approach
- 2D/Stereo/360/Volumetric Video
Vision and Psychophysics

• Viewer comfort and adaptation
• Multi-spectral display
• Color and frequency perception
Human Perception

- Deep Learning based perception modeling
- Complete "experience" modeling
- Multi-illuminant adaptation
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Areas of Interest for Networking & Cloud

Application Areas
- Streaming Media
- Networking Protocols
- Software-Defined Networks & Virtualization
- Data-driven Media Experience Management
- Distributed Compute & Storage

Research Areas
- Network and Channel Coding
- Advanced Networking Protocols / Content-centric Paradigms
- Decentralized / Distributed Systems and Compute
- Dynamic System Identification & Control (via DNN)
- Sparse Modeling / Sensing
- E2E Insight / Performance Measurement
Info Theory & Coding, Protocols & Paradigms
Dynamic System Identification/Control, Sparse Sampling

Time-to-First-Byte (TTFB) and Number of Request Failures - 1 Hour Interval (900 Requests / Hour)

Sparse Modeling

Given the observed values, the purpose is to find the factor a from which the value y was obtained.

\[ y = f(x) \]