
**Information technology — Multimedia
content description interface —**

**Part 9:
Profiles and levels**

**AMENDMENT 1: Extensions to profiles and
levels**

*Technologies de l'information — Interface de description du contenu
multimédia —*

Partie 9: Profils et niveaux

AMENDEMENT 1: Extensions aux profils et niveaux



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Amendment 1 to ISO/IEC 15938-9:2005 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 29, *Coding of audio, picture, multimedia and hypermedia information*.

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Information technology — Multimedia content description interface —

Part 9: Profiles and levels

AMENDMENT 1: Extensions to profiles and levels

After 4.4, add the following subclauses:

4.5 AudioVisual Description Profile (AVDP)

4.5.1 Application Areas

The description tools in this profile can be used to describe the results of various kinds of media analysis with visual and audio low-level features. Consequently the information resulting from media analysis, such as shot/scene detection, face recognition/tracking, speech recognition, copy detection and summarisation, can be used in a wide range of applications such as archive management, news, new services for new media, and many academic projects handling large scale video content, e.g. benchmarking initiatives. The goal is to support establishing an environment where users can exchange evaluation results of media analysis, hence helping the introduction of automatic media analysis tools into many application areas.

4.5.2 Functionality

The main functionality of this profile is describing the results of automatic media analysis with low-, mid- and high-level features for audio-visual content.

The profile supports high-level functionalities such as (but not limited to) the following:

- Provides tools for describing feature extraction tool, version, contributors, and the date/time the tool applied
- Provides tools for describing several results with confidence levels in multiple timelines.
- Provides tools for describing the results of segmentation, text recognition, person identification, format detection, genre detection, keyword extraction, speech recognition, and subject classification.
- Provides tools for describing the results of copy detection and summarization with having several descriptions of audio-visual contents in one document.

4.5.3 Tools in the Profile

This profile is defined with respect to the Version 2 schema as specified in ISO/IEC 15938-10. The namespace of the Version 2 schema providing a basis for this profile is "urn:mpeg:mpeg7:schema:2004." The following table lists the ISO/IEC 15938 description tools (global elements, global attributes, attribute groups, complexTypes and simpleTypes) and the profile constraints that are part of this profile.

Table AMD 1.1 — Description Profile Tool for AVDP

Global Elements	Name	Constraint
Mpeg7	DescriptionUnit	element excluded
	Description	The document may contain an unlimited number of content descriptions (e.g. for describing a set of contents which contain copies and need to be cross-referenced, or for referencing source segments from a summary). At most one of these descriptions can be of type SummaryDescriptionType.
Global Attributes	Name	Constraint
dim		
Global Attribute Groups	Name	Constraint
audioSpectrumAttributeGrp		
mediaTimePropertyGrp	mediaTimeBase	The XPath shall not contain axis specifiers, i.e. it excludes elements [5] and [6] from the datatype definition in Annex A.1 of ISO/IEC 15938-5. On the root a/v segment, mediaTimeBase may only point to a MediaLocator element in the same description, i.e. the value is limited to be one of • MediaLocator • MediaInformation/MediaProfile/MediaInstance[i]/MediaLocator where i is integer, and can be omitted if only one profile/instance exists.
referenceGrp	idref	attribute excluded
	href	attribute excluded
	xpath	ReferenceType is only used in Availability/InstanceRef. The value of the xpath attribute shall be “../..../MediaInformation/MediaProfile/MediaInstance[i]” where i is integer, and can be omitted if only one profile/instance exists.

Complex Types	Name	Constraint
AdvancedFaceRecognitionType		
AgentType	Icon	element excluded
AudioBPMTType		
AudioDSType		
AudioDType		
AudioFundamentalFrequencyType		
AudioHarmonicityType		
AudioLLDScalarType		
AudioLLDVectorType		
AudioPowerType		
AudioSegmentTemporalDecompositionType	AudioSegmentRef	element excluded
AudioSegmentType	MediaTime	minOccurs = "1"
	TemporalMask	element excluded
	MediaSourceDecomposition	element excluded
AudioSignalQualityType		
AudioSignatureType		
AudioSpectrumBasisType		
AudioSpectrumCentroidType		
AudioSpectrumEnvelopeType		
AudioSpectrumFlatnessType		
AudioSpectrumProjectionType		
AudioSpectrumSpreadType		

AudioSummaryComponentType	Title	element excluded ^{a)}
	AudioSourceID	minOccurs = "1"; AudioSourceID is defined to reference MediaInformation/MediaProfile/MediaInstance[i]/InstanceIdentifier, where i is integer, of the root content segment of a content description.
	AudioSourceLocator	minOccurs = "1"
	ComponentSourceTime	element excluded
	SoundLocator	element excluded
	SyncTime	element excluded
AudioTempoType		
AudioVisualSegmentMediaSourceDecompositionType	AudioVisualSegment	element excluded
	AudioVisualSegmentRef	element excluded
	VideoSegmentRef	element excluded
	StillRegionRef	element excluded
	AudioSegmentRef	element excluded
AudioVisualSegmentTemporalDecompositionType	AudioVisualSegmentRef	element excluded
	AudioVisualRegion	element excluded
	AudioVisualRegionRef	element excluded
AudioVisualSegmentType	MediaTime	minOccurs = "1"
	TemporalMask	element excluded
	SpatialDecomposition	element excluded
	SpatioTemporalDecomposition	element excluded
AudioVisualType		
AudioWaveformType		
AvailabilityType	Financial	element excluded
	Rights	element excluded
BackgroundNoiseLevelType		
BalanceType		
BandwidthType		

BoxListType		
CameraMotionSegmentType		
CameraMotionType		
ClassificationType	Release	element excluded
	Target	element excluded
	ParentalGuidance	element excluded
	MediaReview	element excluded
ColorLayoutType		
ColorQuantizationType		
ColorSamplingType		
ColorSpaceType		
ColorStructureType		
ColorTemperatureType		
CompleteDescriptionType	DescriptionMetadata	element excluded
	Relationships	element excluded
	OrderingKey	element excluded
ConfusionCountType		
ContentAbstractionType		
ContentDescriptionType		
ContentEntityType	MultimediaContent	maxOccurs = "1"
ContourShapeType		
ControlledTermUseType		
CreationInformationType		
CreationToolType		
CreationType	TitleMedia	may only be used on the root a/v segment
CreatorType		
CrossChannelCorrelationType		

DSType	Header	The following headers may be used: <i>Description Metadata</i> • A complete DescriptionMetadata DS is required on each top level temporal decomposition, and optional on the root a/v segment. • A description metadata element that only specifies the Confidence of a description scheme, may be used on any segment whenever the description scheme does not provide any other means to specify the confidence of the description. It is assumed that the confidence levels are not normalised across tools and thus they are not directly comparable. The Confidence shall not occur in description metadata headers in summaries. <i>Headers from part 3 and 4 types</i> may be used on any segment. The use of Header is prohibited on all other elements.
	id	IDs shall be used on the following elements: • All segments • Top-level temporal decompositions IDs may be used on any other description scheme.
	timePropertyGrp	attribute group excluded
	mediaTimePropertyGrp	mediaTimePropertyGrp shall be used on the root a/v segment, and allowed only on TemporalDecompositionType, SpatioTemporalDecompositionType SummarizationType and SummaryType. If SummarizationType has mediaTimepropertyGrp, each of the SummaryType elements may have mediaTimePropertyGrp, otherwise each of the element shall have mediaTimePropertyGrp.
DType		

DcOffsetType		
DescriptionMetadataType	Package	element excluded
	*	At least one element shall be present.
DescriptionProfileType		
DisseminationType		
DominantColorType		
DoubleDiagonalMatrixType		
DoubleMatrixType		
EdgeHistogramType		
ElectronicAddressType		
ErrorEventType		
ExtendedLanguageType		
FaceRecognitionType		
FigureTrajectoryType		
FloatDiagonalMatrixType		
FloatMatrixType		
FocusOfExpansionType		
FractionalPresenceType		
GeographicPointType		
GoFGoPColorType		
GofGopFeatureType		
GridLayoutType		
HarmonicInstrumentTimbreType		
HarmonicSpectralCentroidType		
HarmonicSpectralDeviationType		
HarmonicSpectralSpreadType		
HarmonicSpectralVariationType		
HeaderType		

HierarchicalSummaryType	SummaryThemeList	element excluded
	SummarySegmentGroupRef	element excluded
	components	attribute excluded
	hierarchy	fixed="dependent"
HomogeneousTextureType		
IlluminationInvariantColorType		
ImageLocatorType	MediaTimePoint	element excluded
	MediaRelTimePoint	element excluded
	BytePosition	element excluded
ImageTextType		
InlineTermDefinitionType	Name	(See footnote) ^{b)}
	Definition	element excluded
	Term	element excluded
InstrumentTimbreType		
IntegerDiagonalMatrixType		
IntegerMatrixType		
IrregularVisualTimeSeriesType		
KeyType		
KeywordAnnotationType		
LexiconType		
LogAttackTimeType		
MediaAgentType	AgentRef	element excluded
MediaFormatType	Medium	element excluded
	System	element excluded
	Bandwidth	element excluded
	TargetChannelBitRate	element excluded
	ScalableCoding	element excluded
	Emphasis	element excluded
	Presentation	element excluded
	SceneCodingFormat	element excluded
	GraphicsCodingFormat	element excluded
	OtherCodingFormat	element excluded

MediaIdentificationType	AudioDomain	element excluded
	VideoDomain	element excluded
	ImageDomain	element excluded
MediaIncrDurationType	mediaTimeUnit	attribute excluded The value of the mediaTimeUnit attribute on the closest parent TemporalDecomposition or SpatiotemporalDecomposition element applies. If the attribute is not present on any of the parent TemporalDecomposition or SpatiotemporalDecomposition elements, the value of the mediaTimeUnit attribute of the root a/v segment shall be used.
MediaInformationType	MediaProfile	maxOccurs = "1"
MediaInstanceType	LocationDescription	element excluded
MediaLocatorType	InlineMedia	element excluded
MediaProfileType	MediaTranscodingHints	element excluded
	master	attribute excluded
MediaQualityType	RatingInformationLocator	element excluded
MediaRelIncrTimePointType	mediaTimeUnit	attribute excluded The value of the mediaTimeUnit attribute on the closest parent TemporalDecomposition or SpatiotemporalDecomposition element applies. If the attribute is not present on any of the parent TemporalDecomposition or SpatiotemporalDecomposition elements, the value of the mediaTimeUnit attribute of the root a/v segment shall be used.
	mediaTimeBase	attribute excluded The value of the mediaTimeBase attribute on the closest parent TemporalDecomposition or SpatiotemporalDecomposition element applies. If the attribute is not present on any of the parent TemporalDecomposition or SpatiotemporalDecomposition elements, the value of the mediaTimeBase attribute of the root a/v segment shall be used.

MediaSourceSegmentDecompositionType		
MediaTimeType	MediaTimePoint	element excluded
	MediaRelTimePoint	element excluded
	MediaDuration	element excluded
MelodyContourType		
MelodySequenceType		
MelodyType		
MeterType		
MinusOneToOneMatrixType		
MixtureAmountOfMotionType		
MixtureCameraMotionSegmentType		
MotionActivityType		
MotionTrajectoryType		
MovingRegionFeatureType		
MovingRegionSpatioTemporalDecompositionType	MovingRegionRef	element excluded
	StillRegionRef	element excluded
MovingRegionType	SpatioTemporalMask	element excluded
	GofGopFeature	element excluded
	MultipleView	element excluded
	SpatialDecomposition	element excluded
	SpatioTemporalLocator	minOccurs = "1"
	TemporalDecomposition	element excluded
	MediaSourceDecomposition	element excluded
Mpeg7BaseType		
Mpeg7Type	DescriptionProfile	minOccurs = "1"
	DescriptionMetadata	minOccurs = "1"
	timePropertyGrp	attribute group excluded
	mediaTimePropertyGrp	attribute group excluded
MultimediaContentType		

NameComponentType		
NonMixtureAmountOfMotionType		
NonMixtureCameraMotionSegmentType		
OrganizationType	ContactRef	element excluded
	Jurisdiction	element excluded
	JurisdictionRef	element excluded
	AddressRef	element excluded
ParameterTrajectoryType		
ParametricMotionType		
PercussiveInstrumentTimbreType		
PersonGroupType	MemberRef	element excluded
	Jurisdiction	element excluded
	JurisdictionRef	element excluded
	AddressRef	element excluded
PersonNameType		
PersonType	OrganizationRef	element excluded
	PersonGroupRef	element excluded
	AddressRef	element excluded
PhoneLexiconType		
PlaceType		
ProbabilityMatrixType		
RatingType		
ReferenceType		
RegionLocatorType		
RegionShapeType		
RegularVisualTimeSeriesType		

RelatedMaterialType	DisseminationFormat	element excluded
	MediaInformation	element excluded
	MediaInformationRef	element excluded
	CreationInformation	element excluded
	CreationInformationRef	element excluded
	UsageInformation	element excluded
	UsageInformationRef	element excluded
RelationType	type	use = "required"
	source	attribute removed ^{c)}
	strength	Note: It is assumed that the strength levels are not normalised across tools and thus they are not directly comparable.
	target	restricted length of list to 1 ^{d)}
RelativeDelayType		
RightsType		
ScalableColorType		
ScalableSeriesType		
SegmentDecompositionType	criteria	restricted to URI pattern ^{e)} criteria of the decomposition deeper than 2 level shall not use the same value of criteria previously used in their ancestor decomposition level, i.e. level 1 and 2. ^{f)}
SegmentType	MediaInformation	MediaInformation shall be used on the root a/v segment and may not be used on any other segment
	MediaInformationRef	element excluded
	MediaLocator	MediaLocator can be optionally used on key frame segments to refer to extracted key frame images
	StructuralUnit	minOccurs = "1" StructuralUnit of the segment deeper than 2 level shall not use the same value of StructuralUnit previously used in their ancestor segment level, i.e. level 1 and 2. ^{g)}
	CreationInformationRef	element excluded

	UsageInformation	UsageInformation can be optionally used on the root a/v segment and may not be used on any other segment
	UsageInformationRef	element excluded
	Semantic	element excluded
	SemanticRef	element excluded
	MatchingHint	element excluded
	PointOfView	element excluded
SequentialSummaryType	AudioVisualSummaryLocator	AudioVisualSummaryLocator is optional, but if used, it shall point to a segment representing the complete content, i.e. either the root a/v segment of a description, or a segment in a decomposition of the root a/v segment with the same start time and duration.
	VideoSummaryLocator	VideoSummaryLocator is optional, but if used, it shall point to a segment representing the complete content, i.e. either the root a/v segment of a description, or a segment in a decomposition of the root a/v segment with the same start time and duration.
	AudioSummaryLocator	AudioSummaryLocator is optional, but if used, it shall point to a segment representing the complete content, i.e. either the root a/v segment of a description, or a segment in a decomposition of the root a/v segment with the same start time and duration.
	TextualSummaryComponent	element excluded
	components	attribute excluded
SeriesOfScalarBinaryType		
SeriesOfScalarType		
SeriesOfVectorBinaryType		
SeriesOfVectorType		
Shape3DType		
ShapeVariationType		

SilenceHeaderType		
SilenceType		
Spatial2DCoordinateSystemType		
SpatialSegmentDecomposition Type		
SpatioTemporalLocatorType		
SpatioTemporalSegmentDecomposition Type		
SpeakerInfoType		
SpectralCentroidType		
SpokenContentHeaderType		
SpokenContentIndexEntryType		
SpokenContentLatticeType		
SpokenContentLinkType		
StillRegionFeatureType		
StillRegionSpatialDecomposition Type	StillRegionRef	element excluded
StillRegionType	SpatialMask	element excluded
	MediaTimePoint	element excluded
	MediaRelTimePoint	element excluded
	IlluminationInvariantColor	element excluded ^{h)}
	MultipleView	element excluded
StructuredAnnotationType		
SummarizationType		
SummaryDescriptionType	Summarization	maxOccurs = "1"
SummarySegmentGroupType	Caption	element excluded
	SummarySegmentRef	element excluded
	SummarySegmentGroupRef	element excluded
	level	attribute excluded
	duration	attribute excluded
	numOfKeyFrames	attribute excluded

	fidelity	fidelity will be used to define a relative score for using alternative segments instead of the parent segment. There can be groups with just one segment on the top level, the score is then 1.0. If it is necessary to have such a score for each segment, a binary tree with a segment and a group on each level can be created. If no values for fidelity are specified, the fidelity of the segments is assumed to be equal. It is assumed that the fidelity levels are not normalised across tools and thus they are not directly comparable.
	themeIDs	attribute excluded
SummarySegmentType	SourceID	SourceID is defined to reference MediaInformation/MediaProfile/MediaInstance/InstanceIdentifier of the root content segment of a content description. If it is not present, the value SummaryType/SourceID applies to the segment.
	KeyFrame	element excluded
	KeySound	element excluded
	themeIDs	attribute excluded
	order	(See footnote) ⁱ⁾
SummaryType	SourceID	SourceID is defined to reference MediaInformation/MediaProfile/MediaInstance[i]/InstanceIdentifier, where i is integer, of the root content segment of a content description.
	SourceLocator	element excluded
	SourceInformation	element excluded
TemporalCentroidType		
TemporalInterpolationType	MediaDuration	element excluded
	MediaTimePoint	element excluded
	MediaIncrTimePoint	element excluded
TemporalSegmentDecompositionType		
TemporalSegmentLocatorType	BytePosition	element excluded

TermDefinitionBaseType		
TermUseType		
TextAnnotationType	DependencyStructure	element excluded
TextualBaseType		
TextualType		
TextureBrowsingType		
TimeType	RelTimePoint	element excluded
	RelIncrTimePoint	element excluded
	IncrDuration	element excluded
TitleMediaType		
TitleType		
TransmissionTechnologyType		
UniqueIDType		
UsageInformationType	Rights	element excluded
	FinancialResults	element excluded
	UsageRecord	element excluded
VideoSegmentFeatureType		
VideoSegmentSpatioTemporalDecompositionType	MovingRegionRef	element excluded
	StillRegionRef	element excluded
VideoSegmentTemporalDecompositionType	VideoSegmentRef	element excluded
	StillRegionRef	element excluded
VideoSegmentType	MediaTime	minOccurs = "1"
	TemporalMask	element excluded
	MultipleView	element excluded
	Mosaic	element excluded
	SpatialDecomposition	element excluded
	MediaSourceDecomposition	element excluded
VideoTextType		
VisualIDSType		
VisualIDType		
VisualSummaryComponentType	VideoSourceID	minOccurs = "1"; VideoSourceID is defined to reference

		MediaInformation/MediaProfile/ MediaInstance[i]/InstanceIdentifier, where i is integer, of the root content segment of a content description.
	VideoSourceLocator	minOccurs = "1"
	ComponentSourceTime	element excluded
	ImageLocator	element excluded
	SyncTime	element excluded
	FrameActivity	element excluded
	Region	element excluded
VisualTimeSeriesType		
WordLexiconType		
Simple Types	Name	Constraint
PhoneLexiconIndexType		
PhoneType		
WordLexiconIndexType		
WordType		
basicDurationType		
basicTimePointType		
beatType		
characterSetCode		
contourType		
countryCode		
currencyCode		
curvatureType		
degreeAccidentalType		
degreeNoteType		
doubleVector		
durationType		
floatVector		
integerVector		
listOfPositiveIntegerForDim		

contentType		
minusOneToOneType		
minusOneToOneVector		
nonNegativeReal		
phoneticAlphabetType		
probabilityVector		
regionCode		
scaleType		
termAliasReferenceType		
termReferenceListType		
termReferenceType		
termRelationQualifierType		
termURIReferenceType		
textureListType		
timePointType		
unsigned1		
unsigned10		
unsigned11		
unsigned12		
unsigned13		
unsigned14		
unsigned15		
unsigned16		
unsigned17		
unsigned18		
unsigned19		
unsigned2		
unsigned20		
unsigned21		
unsigned22		
unsigned23		

unsigned24		
unsigned25		
unsigned26		
unsigned27		
unsigned28		
unsigned29		
unsigned3		
unsigned30		
unsigned31		
unsigned32		
unsigned4		
unsigned5		
unsigned6		
unsigned7		
unsigned8		
unsigned9		
xPathAbsoluteSelectorType		
xPathFieldType		
xPathRefType		
xPathSelectorType		
xPathType		
zeroToOneType		
a) For conformance with VisualSummaryComponentType b) included to increase readability in addition to reference to term in CS, ControlledTermUseType has mandatory href attribute c) It is assumed that the segment on which the relation is annotated is the source of the relation. d) if there are relations between a segment and several others, several relation elements shall be used. e) Use reference to term in CS f) The level of segment is defined by the number of decompositions needed to reach the segment from the root a/v segment. g) The decomposition level is the number of decomposition appearance from the root a/v segment. h) Considered redundant to VisualDescriptor i) Alternative segments in the ground truth shall have the same order.		

4.5.4 Levels for AVDP

No levels are defined for the AudioVisual Description Profile.

NOTE Levels for this profile may be defined in the future by means of an amendment to this part of ISO/IEC 15938.

4.5.5 Semantics for AVDP

This semantics defines the use of the selected tools for providing the interoperability. Figure AMD 1.1 indicates the Top level structure for content description supported by this profile. (a) is the most basic case to describe an audiovisual content. (b) is for describing some relations between more than two audiovisual contents. (c) is for describing a result of summarization itself. (d) is for describing a result of summarization with the related audiovisual contents.

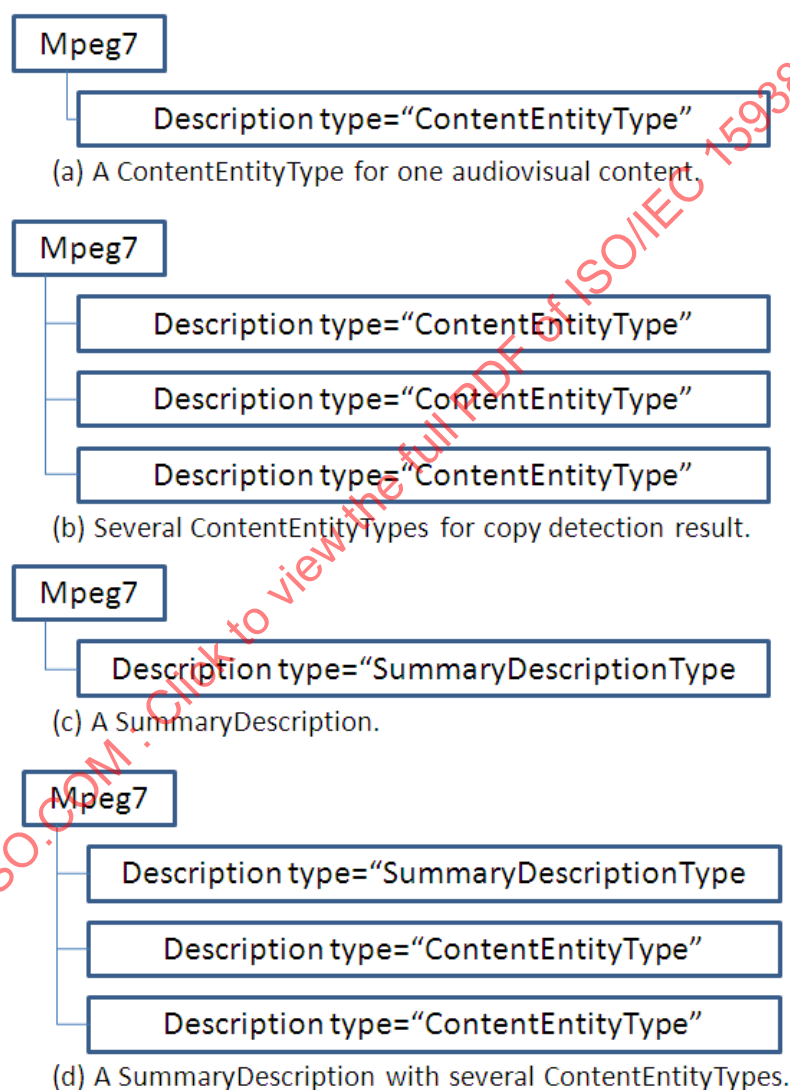


Figure AMD 1.1 — Top level structure

Figure AMD 1.2 indicates the high level structure for content description supported by this profile.

The root audiovisual segment (AudioVisual) expresses a whole content to which automatic media analysis is applied, and it is decomposed by Temporal Decompositions (TD) into AudioVisualSegment (AVS, henceforth referred as AVS-1st). Each temporal decomposition corresponds to an experimental result of media analysis, and it has a criteria (e.g. shot, ASR, ...). Therefore each AVS-1st segment is a result of media analysis in term of specified criteria, and also take a role of container. If audio and/or video descriptors are needed, the AVS-1st segments are decomposed by means of Media Source Decomposition (MSD) into Video and Audio Segments (VS and AS), to which the descriptors are attached. These VS/AS segments shall have the same duration as the AVS-1st and appropriate structural unit values. There can be as many such video/audio segments (VS/AS) as there are video/audio channels. As for further decomposition into deeper AVS-*n*th in AVS-1st, temporal decomposition (TD) shall be used without the restriction on number of the levels. Levels deeper than 2 shall not use the same criteria/Structural Unit as previously used for higher levels. Spatial or spatiotemporal decompositions are not allowed for the AVS-1st segments. The level of segment is defined by the number of decompositions needed to reach the segment from the root a/v segment. The decomposition level is the number of decomposition appearance from the root a/v segment. Therefore in Figure AMD 1.2, TD under AudioVisual is the first-level decomposition and the level of AVS-1st is 1. As for AS, VS, VS-key, AS-key, SR cannot have "level 1", they start from level 2. As for Moving Regions (MR), they can start on level 3.

There can be several MSD of an AVS-1st, e.g. one into modalities and one into key elements. If the MSD has the criteria *genericmsd* (from DecompositionCS, expressing non-specific MSD) it may hold all types of segments, however, in this case only this single MSD may be present. If more than one MSD is present, none of them may use the criteria *genericmsd*.

Key frames are represented in the same MSD of AVS-1st segment as the Video segment – (simplest solution, allows to access key frames always in the same way). Key frames could be extended to key clips (1 frame <= key frame duration < duration of AVS-1st segment). Therefore if the duration of the video segment is not equal to that of AVS-1st segment, the video segment is key frame or key clip (VS-key). In a similar way, key audio clips (AS-key) can be included in the same in this MSD. Key frame, key video and audio clips shall be annotated with appropriate structural units. Key frames/clips are not allowed to have any further decomposition and no feature descriptions.

Results of visual and audio feature extraction from the complete segment may be added to the video or audio segment under the MSD of the segment, i.e. AVS-1st. Results of visual feature extraction from single frames within the segment or regions of single frames shall be described using StillRegionType elements contained in the MSD of the segment and optionally further spatial decompositions of the still region. The still region element directly in the MSD shall represent a full frame, those in the decompositions below may refer to regions (e.g. face regions, image text). Results of feature extraction from the complete segment or a subsegment, which create region information with a temporal extent of more than one frame shall be described as moving regions in a spatiotemporal decomposition of the video segment. The moving regions may be further decomposed into moving regions by means of spatiotemporal decompositions.

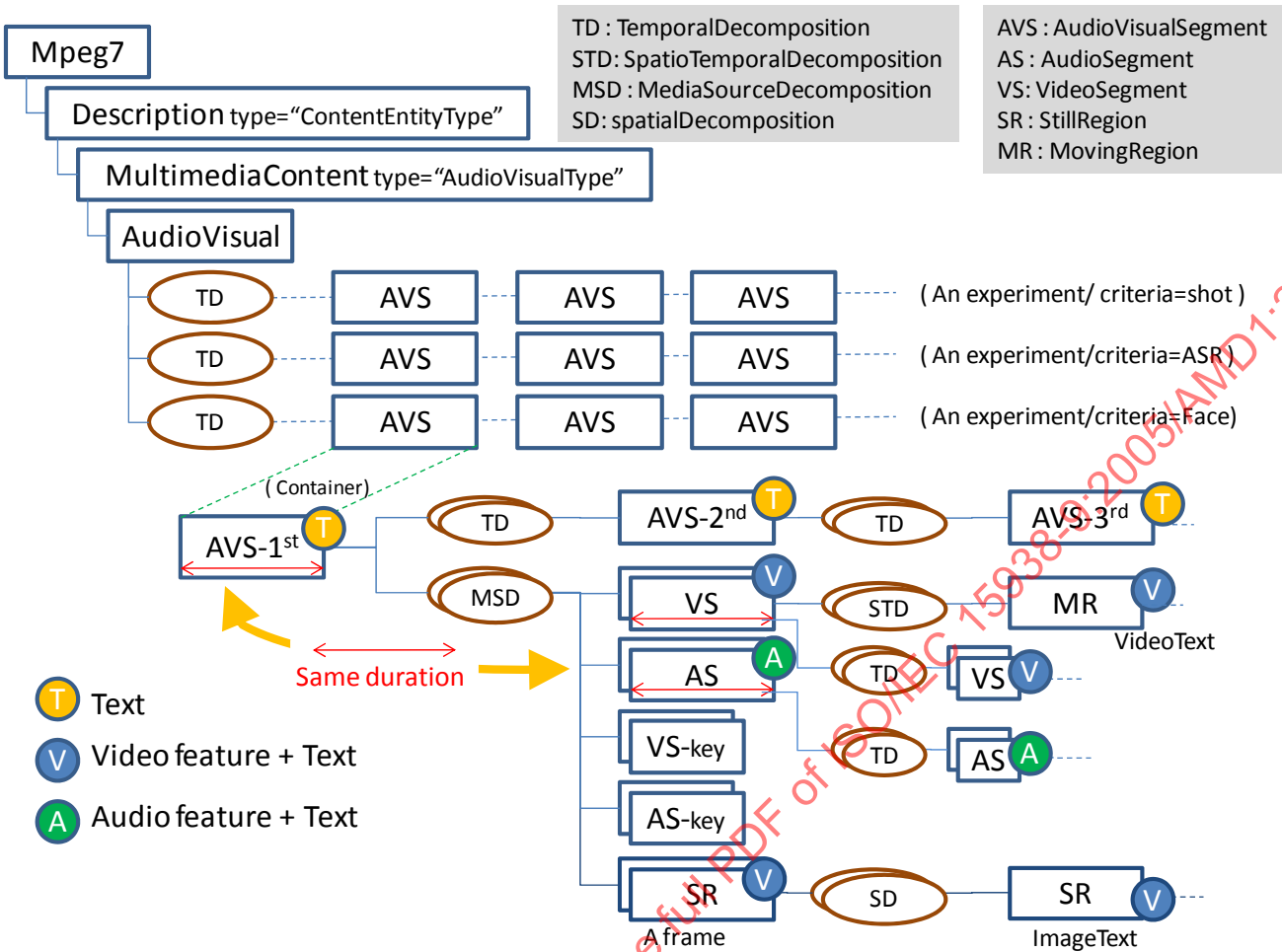


Figure AMD 1.2 — Basic structure of AVDP descriptions

4.5.6 Classification Schemes

AVDP makes use of reference data also known as controlled terms. It is strongly recommended to use controlled terms, represented e.g. as MPEG-7 classification schemes, whenever possible. While ClassificationSchemeType is not included in the profile, descriptions conforming to the profile can make reference to terms defined in MPEG-7 classification schemes. Different classification schemes can be used e.g. from MPEG or EBU (<http://www.ebu.ch/metadata/cs>) as their share a common format.

The following table lists all instances of (Controlled)TermUseType in the profile, for which it is considered best practice to reference terms from classification schemes. The table contains some element of other type (e.g. anyURI), for which classification schemes shall be used as well.

Table AMD 1.2 — Examples of Classification schemes used in AVDP

Type	Element/Attribute	Recommended CS
MediaFormatType	FileFormat	ebu_FileFormatCS
	VisualCoding/Format	ebu_videoCompressionCodeCS
	AudioCoding/Format	ebu_AudioCompressionCodeCS
MediaAgentType	Role	ebu_RoleCodeCS

ClassificationType	Genre	ebu_ContentGenreCS
	Format	ebu_EditorialFormatCodeCS
RelationType	Type	SegmentRelationCS
SegmentType	StructuralUnit	StructuralUnitCS
SegmentDecompositionType	Criteria	DecompositionCS

Replace Clause 5 with the following:

5 MPEG-7 Profile URI Values and Schema Namespace

The following table contains ISO/IEC 15938 standard profile URI values:

Table 4 — Profile URI Values

MPEG-7 Profile Name	ProfileAndLevelIndication URI Value	ISO/IEC 15938-10 Schema Namespace
Simple Metadata Profile and Level	urn:mpeg:mpeg7:profiles:2004:SMP	urn:mpeg:mpeg7:schema:2001
User Description Profile and Level	urn:mpeg:mpeg7:profiles:2004:UDP	urn:mpeg:mpeg7:schema:2001
Core Description Profile and Level	urn:mpeg:mpeg7:profiles:2004:CDP	urn:mpeg:mpeg7:schema:2001
AudioVisual Description Profile and Level	urn:mpeg:mpeg7:profiles:2011:AVDP	urn:mpeg:mpeg7:schema:2004

Add the following Annex:

Annex A (informative)

XM for AudioVisual Description Profile (AVDP)

A.1 Introduction

This Annex contains AVDP's reference software in the form of metadata instances compliant with the AVDP profile. These instances have been validated during the AVDP evaluation phase using the AVDP validation tool developed by Joanneum Research and accessible at <http://vamp.joanneum.at>.

A.2 Reference software: MediaAnalyse data, Joanneum Research, Austria

The MediaAnalyse tool automatically extracts metadata from video files for navigation and structuring (e.g. shot boundaries, key frames) and metadata which enables fast semi-automatic annotation, e.g. camera motion and face occurrences. Figure A.1 shows the MediaAnalyse user interface for batch analysis. An MPEG-7 document is produced for each of the input video files.

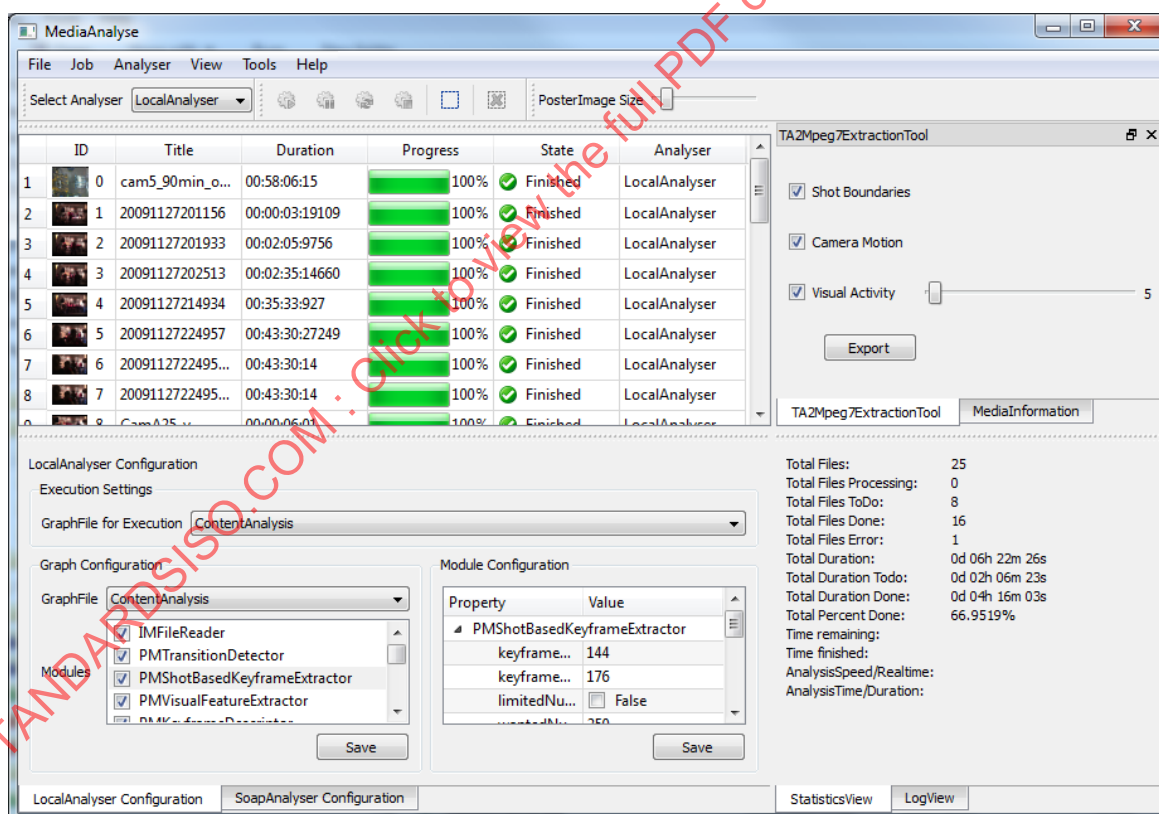


Figure A.1 — MediaAnalyse User Interface

The following content analysis modules are included in the tool:

- Shot boundary detection, detecting hard cuts and dissolves
- Key-frame extraction, extracting key frames for each shot
- Stripe images, providing an overview visualisation as an image composed from the center columns of each frame of a segment
- Camera motion, i.e. pan left, pan right, tilt up, tilt down, zoom in, zoom out, a value indicating the strength of the movement is calculated
- Camera motion, i.e. pan left, pan right, tilt up, tilt down, zoom in, zoom out, a value indicating the strength of the movement is calculated
- Face detection, annotating rectangles where a face has been detected in the video

Description of analysis results

In order to represent the output of the tool, the following elements need to be included in the description:

- The shot structure of the video
- For each shot
 - One or more key frames representing the shot
 - The camera motion description
 - A spatiotemporal decomposition into regions representing face detections
- The stripe images as a separate list of segments

MPEG-7 AVDP output

The tool generates output documents compliant to MPEG-7 AVDP. An example output of the tool can be found in below (reduced to one shot for readability).

```
<?xml version="1.0" encoding="utf-8"?>
<Mpeg7 xsi:schemaLocation="urn:mpeg:mpeg7:schema:2004 avdp-2010.xsd"
xmlns="urn:mpeg:mpeg7:schema:2004" xmlns:mpeg7="urn:mpeg:mpeg7:schema:2004"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <DescriptionProfile profileAndLevelIndication="urn:mpeg:mpeg7:profiles:2011:AVDP" />
  <DescriptionMetadata>
    <PrivateIdentifier>PID_1</PrivateIdentifier>
    <Instrument>
      <Tool>
        <Name>MediaAnalyse</Name>
      </Tool>
    </Instrument>
  </DescriptionMetadata>
  <Description xsi:type="mpeg7:ContentEntityType">
    <MultimediaContent xsi:type="mpeg7:AudioVisualType">
      <AudioVisual mediaTimeUnit="PT1N23F"
mediaTimeBase="mpeg7:MediaInformation/mpeg7:MediaProfile/mpeg7:MediaInstance/mpeg7:MediaLocator"
id="AVID 1">
        <MediaInformation>
          <MediaProfile>
```

```

<MediaFormat>
  <Content href="uri:2">
    <Name>Audiovisual</Name>
  </Content>
  <FileFormat href="uri:3">
    <Name>mpeg</Name>
  </FileFormat>
  <FileSize>3385344</FileSize>
</MediaFormat>
<MediaInstance>
  <InstanceIdentifier>15122008060</InstanceIdentifier>
  <MediaLocator>
    <MediaUri>M:/TA2 (KAR) /TA2-WOODBRIDGE-SCHOOL/(converted)/transcoded/NokiaMPEG4
transcoded/15122008060.mpeg</MediaUri>
  </MediaLocator>
</MediaInstance>
</MediaProfile>
</MediaInformation>
<StructuralUnit href="http://www.ebu.ch/metadata/cs/mpeg/avdp/StructuralUnitCS#1">
  <Name>Programme</Name>
</StructuralUnit>
<CreationInformation>
  <Creation>
    <Title>Undefined</Title>
  </Creation>
</CreationInformation>
<MediaTime>
  <MediaRelIncrTimePoint>0</MediaRelIncrTimePoint>
  <MediaIncrDuration>507</MediaIncrDuration>
</MediaTime>
<TemporalDecomposition id="VSID 1 TD 1"
criteria="http://www.ebu.ch/metadata/cs/mpeg/avdp/DecompositionCS#20" gap="true">
  <Header xsi:type="mpeg7:DescriptionMetadataType">
    <Instrument>
      <Tool>
        <Name>unknown</Name>
      </Tool>
    </Instrument>
  </Header>
  <AudioVisualSegment id="TRID 1 AV">
    <StructuralUnit href="http://www.ebu.ch/metadata/cs/mpeg/avdp/StructuralUnitCS#10">
      <Name>Shot</Name>
    </StructuralUnit>
    <MediaTime>
      <MediaRelIncrTimePoint>0</MediaRelIncrTimePoint>
      <MediaIncrDuration>506</MediaIncrDuration>
    </MediaTime>
    <MediaSourceDecomposition
criteria="http://www.ebu.ch/metadata/cs/mpeg/avdp/DecompositionCS#10" id="TRID 1 MSD mod">
      <VideoSegment id="TRID_1">
        <Header xsi:type="mpeg7:DescriptionMetadataType">
          <Confidence>1.000000</Confidence>
        </Header>
        <StructuralUnit href="http://www.ebu.ch/metadata/cs/mpeg/avdp/StructuralUnitCS#10">
          <Name>Shot</Name>
        </StructuralUnit>
        <MediaTime>
          <MediaRelIncrTimePoint>0</MediaRelIncrTimePoint>
          <MediaIncrDuration>506</MediaIncrDuration>
        </MediaTime>

```

```

<VisualDescriptor xsi:type="mpeg7:CameraMotionType">
  <Segment xsi:type="mpeg7:MixtureCameraMotionSegmentType">
    <MediaTime>
      <MediaRelIncrTimePoint>0</MediaRelIncrTimePoint>
      <MediaIncrDuration>24</MediaIncrDuration>
    </MediaTime>
    <FractionalPresence>
      <PanLeft>5</PanLeft>
      <PanRight>31</PanRight>
      <TiltDown>127</TiltDown>
      <TiltUp>21</TiltUp>
      <RollClockwise>5</RollClockwise>
      <RollAnticlockwise>127</RollAnticlockwise>
      <Fixed>47</Fixed>
    </FractionalPresence>
    <AmountOfMotion>
      <PanLeft>0</PanLeft>
      <PanRight>0</PanRight>
      <TiltDown>4</TiltDown>
      <TiltUp>0</TiltUp>
      <RollClockwise>0</RollClockwise>
      <RollAnticlockwise>2047</RollAnticlockwise>
    </AmountOfMotion>
  </Segment>
</VisualDescriptor>
<SpatioTemporalDecomposition criteria="faces">
  <MovingRegion id="MRID_2">
    <StructuralUnit
href="http://www.ebu.ch/metadata/cs/mpeg/avdp/StructuralUnitCS#30">
      <Name>MovingRegion</Name>
    </StructuralUnit>
    <SpatioTemporalLocator>
      <ParameterTrajectory motionModel="still">
        <MediaTime>
          <MediaRelIncrTimePoint>55</MediaRelIncrTimePoint>
          <MediaIncrDuration>1</MediaIncrDuration>
        </MediaTime>
        <InitialRegion>
          <Polygon>
            <Coords mpeg7:dim="2 4">197 86 0 -86 74 0 86 0</Coords>
          </Polygon>
        </InitialRegion>
      </ParameterTrajectory>
    </SpatioTemporalLocator>
  </MovingRegion>
</SpatioTemporalDecomposition>
</VideoSegment>
</MediaSourceDecomposition>
<MediaSourceDecomposition
criteria="http://www.ebu.ch/metadata/cs/mpeg/avdp/DecompositionCS#11" gap="true" overlap="false"
id="TRID_1_MSD_key">
  <VideoSegment id="SHOT_KFID_1_AV">
    <StructuralUnit href="http://www.ebu.ch/metadata/cs/mpeg/avdp/StructuralUnitCS#11">
      <Name>Keyframe</Name>
    </StructuralUnit>
    <MediaTime>
      <MediaRelIncrTimePoint>3</MediaRelIncrTimePoint>
      <MediaIncrDuration>1</MediaIncrDuration>
    </MediaTime>
  </VideoSegment>

```

```

        </MediaSourceDecomposition>
    </AudioVisualSegment>
</TemporalDecomposition>
<TemporalDecomposition id="VSID_1_TD_2" criteria="urn:x-davp_criteria:stripe_images"
gap="true">
    <Header xsi:type="mpeg7:DescriptionMetadataType">
        <Instrument>
            <Tool>
                <Name>unknown</Name>
            </Tool>
        </Instrument>
    </Header>
    <AudioVisualSegment id="SIID 1 AV">
        <StructuralUnit href="urn:x-mpeg-7-davp:cs:StructuralUnitCS:2005:vis.stripeimage">
            <Name>StripeImage</Name>
        </StructuralUnit>
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            <MediaRelIncrTimePoint>0</MediaRelIncrTimePoint>
            <MediaIncrDuration>504</MediaIncrDuration>
        </MediaTime>
        <MediaSourceDecomposition
criteria="http://www.ebu.ch/metadata/cs/mpeg/avdp/DecompositionCS#10" id="SIID 1 MSD mod">
            <VideoSegment id="SIID_1" xsi:type="mpeg7:VideoSegmentType">
                <StructuralUnit href="urn:x-mpeg-7-davp:cs:StructuralUnitCS:2005:vis.stripeimage">
                    <Name>StripeImage</Name>
                </StructuralUnit>
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                    <MediaRelIncrTimePoint>0</MediaRelIncrTimePoint>
                    <MediaIncrDuration>504</MediaIncrDuration>
                </MediaTime>
            </VideoSegment>
        </MediaSourceDecomposition>
    </AudioVisualSegment>
</TemporalDecomposition>
</AudioVisual>
</MultimediaContent>
</Description>
</Mpeg7>

```

A.3 Reference software: ANTS data (Automatic Newscast Transcription System), RAI, Italy

Functionality

RAI – Centre for research and Technological Innovation provides a platform for ingestion and annotation of news material named ANTS (Automated Newscast Transcription System). ANTS makes extensive usage of automated information extraction techniques. It can schedule material acquisition from digital terrestrial television, identify programme boundaries, detect shot boundaries, extract key frames, segment material into editorial units, transcribe speech into electronic text and classify transcribed text. It finally delivers extracted metadata regarding shot and editorial segmentation in compliance to MPEG-7 AVDP. One MPEG-7 document is produced for each elaborated programme.

Figure A.2 shows the ANTS browsing interface.

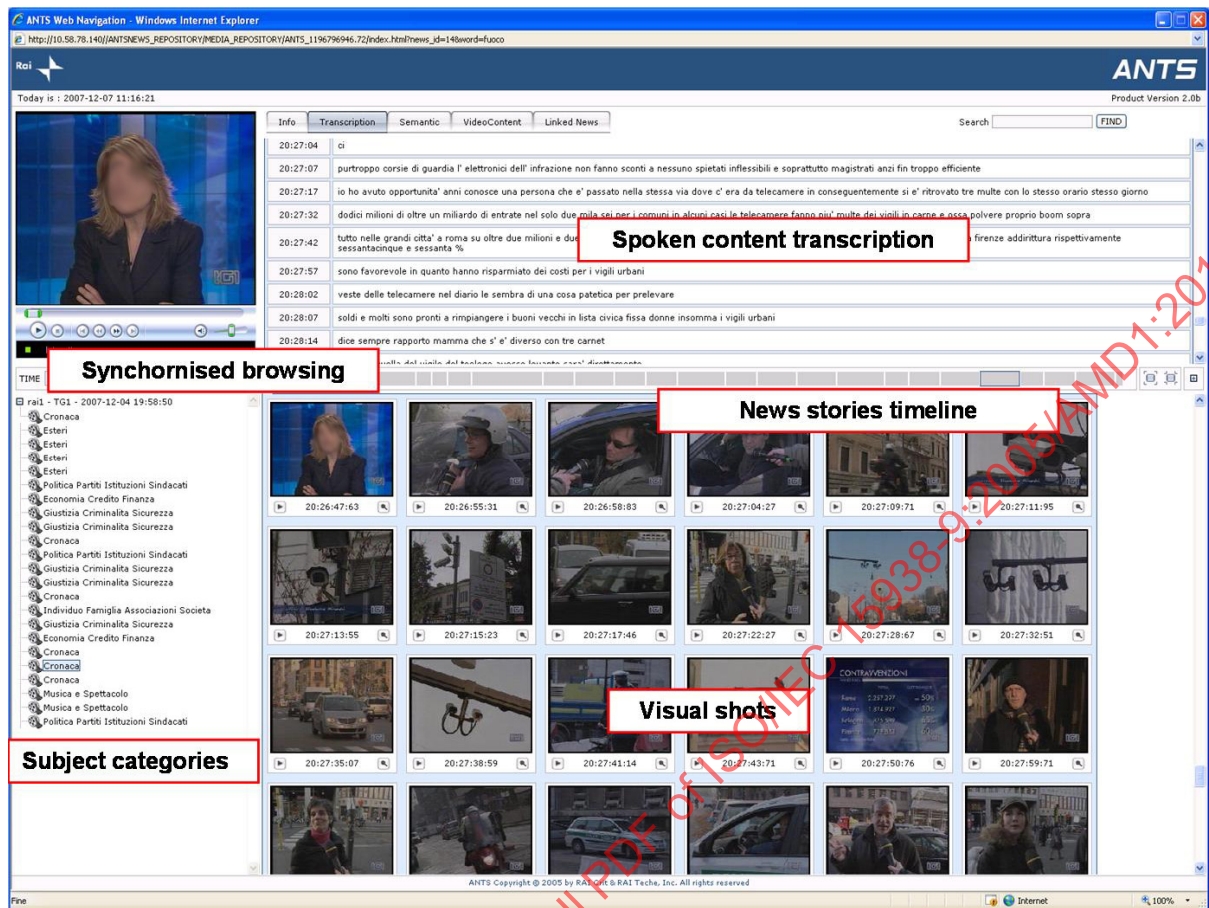


Figure A.2 — ANTS Browsing Interface.

The following analysis modules are included in ANTS:

- Shot boundary detection, detecting hard cuts and dissolves
- Key-frame extraction, extracting key frames for each shot
- Spoken content transcription
 - Editorial segmentation in elementary news stories
 - Classification of transcribed text according to subject categories (e.g., sports, politics, nature)

Description of analysis results

To represent the analysis results concerning shot segmentation and editorial segmentation into elementary units of ANTS the following elements have to be used:

- Shot structure, including temporal references to the main audiovisual object's timeline;
- Editorial segments structure including temporal references to the main audiovisual object's timeline.

Output in MPEG-7 AVDP format

- The serialisation component of ANTS produces documents compliant to MPEG-7 AVDP for what concerns shot detection and news story segmentation. An example output of the tool can be found below. The basic AVDP tool used is TemporalDecomposition of the root Audiovisual Segment using two distinct decomposition criteria.

```
<?xml version="1.0" encoding="UTF-8"?>
<Mpeg7 xmlns="urn:mpeg:mpeg7:schema:2004" xmlns:mpeg7="urn:mpeg:mpeg7:schema:2004"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:date="http://exslt.org/dates-and-times"
xsi:schemaLocation="urn:mpeg:mpeg7:schema:2004 ../profile.xsd">
  <DescriptionProfile profileAndLevelIndication="urn:mpeg:mpeg7:profiles:2011:AVDP"/>
  <DescriptionMetadata>
    <PrivateIdentifier>ANTS 1276512189.03</PrivateIdentifier>
    <Instrument>
      <Tool>
        <Name>Automatic Newscast Transcription System</Name>
      </Tool>
    </Instrument>
  </DescriptionMetadata>
  <Description xsi:type="mpeg7:ContentEntityType">
    <MultimediaContent xsi:type="mpeg7:AudioVisualType">
      <AudioVisual mediaTimeUnit="PT1N25F"
mediaTimeBase="mpeg7:MediaInformation/mpeg7:MediaProfile/mpeg7:MediaInstance/mpeg7:MediaLocator"
id="ANTS_1276512189.03">
        <MediaInformation>
          <MediaProfile>
            <MediaFormat>
              <Content href="uri:2">
                <Name>Audiovisual</Name>
              </Content>
              <FileFormat href="uri:3">
                <Name>Windows Media 9</Name>
              </FileFormat>
            </MediaFormat>
            <MediaInstance>
              <InstanceIdentifier>ANTS_1276512189.03</InstanceIdentifier>
              <MediaLocator>
                <MediaUri>http://10.58.78.128/ANTS 1276512189.03.wmv</MediaUri>
              </MediaLocator>
            </MediaInstance>
          </MediaProfile>
        </MediaInformation>
        <StructuralUnit href="http://www.ebu.ch/metadata/cs/mpeg/avdp/StructuralUnitCS#1">
          <Name>News Programme</Name>
        </StructuralUnit>
        <CreationInformation>
          <Creation>
            <Title>TGI2010-06-11</Title>
          </Creation>
        </CreationInformation>
        <MediaTime>
          <MediaRelIncrTimePoint>0</MediaRelIncrTimePoint>
          <MediaIncrDuration>353500</MediaIncrDuration>
        </MediaTime>
        <TemporalDecomposition
criteria="http://www.ebu.ch/metadata/cs/mpeg/avdp/DecompositionCS#20" gap="true"
id="Shots ANTS 1276512189.03">
          <Header xsi:type="mpeg7:DescriptionMetadataType">
```

```

        <Instrument>
            <Tool>
                <Name>ANTS Shotfinder</Name>
            </Tool>
        </Instrument>
    </Header>
    <AudioVisualSegment id="ID-SHOT-4c124e7a54sk">
        <StructuralUnit
href="http://www.ebu.ch/metadata/cs/mpeg/avdp/StructuralUnitCS#10"/>
            <MediaTime>
                <MediaRelIncrTimePoint>0</MediaRelIncrTimePoint>
                <MediaIncrDuration>6040</MediaIncrDuration>
            </MediaTime>
        </AudioVisualSegment>
    <AudioVisualSegment id="ID-SHOT-4c124e873csk">
        <StructuralUnit
href="http://www.ebu.ch/metadata/cs/mpeg/avdp/StructuralUnitCS#10"/>
            <MediaTime>
                <MediaRelIncrTimePoint>6040</MediaRelIncrTimePoint>
                <MediaIncrDuration>20000</MediaIncrDuration>
            </MediaTime>
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    <AudioVisualSegment id="ID-SHOT-4c124e9b3csk">
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href="http://www.ebu.ch/metadata/cs/mpeg/avdp/StructuralUnitCS#10"/>
            <MediaTime>
                <MediaRelIncrTimePoint>26040</MediaRelIncrTimePoint>
                <MediaIncrDuration>3520</MediaIncrDuration>
            </MediaTime>
        </AudioVisualSegment>
    <AudioVisualSegment id="ID-SHOT-4c124e9f0csk">
        <StructuralUnit
href="http://www.ebu.ch/metadata/cs/mpeg/avdp/StructuralUnitCS#10"/>
            <MediaTime>
                <MediaRelIncrTimePoint>29560</MediaRelIncrTimePoint>
                <MediaIncrDuration>6720</MediaIncrDuration>
            </MediaTime>
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        <StructuralUnit
href="http://www.ebu.ch/metadata/cs/mpeg/avdp/StructuralUnitCS#10"/>
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                <MediaRelIncrTimePoint>36280</MediaRelIncrTimePoint>
                <MediaIncrDuration>3400</MediaIncrDuration>
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        <StructuralUnit
href="http://www.ebu.ch/metadata/cs/mpeg/avdp/StructuralUnitCS#10"/>
            <MediaTime>
                <MediaRelIncrTimePoint>39680</MediaRelIncrTimePoint>
                <MediaIncrDuration>1600</MediaIncrDuration>
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    <AudioVisualSegment id="ID-SHOT-4c124eaa54sk">
        <StructuralUnit
href="http://www.ebu.ch/metadata/cs/mpeg/avdp/StructuralUnitCS#10"/>
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                <MediaIncrDuration>1960</MediaIncrDuration>

```

```

        </MediaTime>
    </AudioVisualSegment>
    <AudioVisualSegment id="ID-SHOT-4c124eac50sk">
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href="http://www.ebu.ch/metadata/cs/mpeg/avdp/StructuralUnitCS#10"/>
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                <MediaRelIncrTimePoint>43240</MediaRelIncrTimePoint>
                <MediaIncrDuration>1920</MediaIncrDuration>
            </MediaTime>
        </AudioVisualSegment>
        <AudioVisualSegment id="ID-SHOT-4c124eae48sk">
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href="http://www.ebu.ch/metadata/cs/mpeg/avdp/StructuralUnitCS#10"/>
                <MediaTime>
                    <MediaRelIncrTimePoint>45160</MediaRelIncrTimePoint>
                    <MediaIncrDuration>960</MediaIncrDuration>
                </MediaTime>
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href="http://www.ebu.ch/metadata/cs/mpeg/avdp/StructuralUnitCS#10"/>
                    <MediaTime>
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                        <MediaIncrDuration>3600</MediaIncrDuration>
                    </MediaTime>
                </AudioVisualSegment>
                <AudioVisualSegment id="ID-SHOT-4c124eb31csk">
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href="http://www.ebu.ch/metadata/cs/mpeg/avdp/StructuralUnitCS#10"/>
                        <MediaTime>
                            <MediaRelIncrTimePoint>49720</MediaRelIncrTimePoint>
                            <MediaIncrDuration>7120</MediaIncrDuration>
                        </MediaTime>
                    </AudioVisualSegment>
                    <AudioVisualSegment id="ID-SHOT-4c124eba28sk">
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href="http://www.ebu.ch/metadata/cs/mpeg/avdp/StructuralUnitCS#10"/>
                            <MediaTime>
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                                <MediaIncrDuration>15000</MediaIncrDuration>
                            </MediaTime>
                        </AudioVisualSegment>
                        <AudioVisualSegment id="ID-SHOT-4c124ec928sk">
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href="http://www.ebu.ch/metadata/cs/mpeg/avdp/StructuralUnitCS#10"/>
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                                    <MediaRelIncrTimePoint>71840</MediaRelIncrTimePoint>
                                    <MediaIncrDuration>2520</MediaIncrDuration>
                                </MediaTime>
                            </AudioVisualSegment>
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href="http://www.ebu.ch/metadata/cs/mpeg/avdp/StructuralUnitCS#10"/>
                                    <MediaTime>
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                                        <MediaIncrDuration>2000</MediaIncrDuration>
                                    </MediaTime>
                                </AudioVisualSegment>
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```

```

        <StructuralUnit
href="http://www.ebu.ch/metadata/cs/mpeg/avdp/StructuralUnitCS#10"/>
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            <MediaIncrDuration>2440</MediaIncrDuration>
        </MediaTime>
    </AudioVisualSegment>
    <AudioVisualSegment id="ID-SHOT-4c124ed024sk">
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            <MediaIncrDuration>2240</MediaIncrDuration>
        </MediaTime>
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    <AudioVisualSegment id="ID-SHOT-4c124ed23csk">
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            <MediaIncrDuration>2880</MediaIncrDuration>
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            <MediaIncrDuration>1560</MediaIncrDuration>
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    <AudioVisualSegment id="ID-SHOT-4c124ee321sk">
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```

```

        <MediaIncrDuration>1070</MediaIncrDuration>
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                <MediaIncrDuration>8920</MediaIncrDuration>
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                    <MediaRelIncrTimePoint>138720</MediaRelIncrTimePoint>
                    <MediaIncrDuration>5080</MediaIncrDuration>
                  </MediaTime>
                </AudioVisualSegment>
                <AudioVisualSegment id="ID-SHOT-4c124f1124sk">
                  <StructuralUnit
href="http://www.ebu.ch/metadata/cs/mpeg/avdp/StructuralUnitCS#10"/>
                    <MediaTime>
                      <MediaRelIncrTimePoint>143800</MediaRelIncrTimePoint>
                      <MediaIncrDuration>2930</MediaIncrDuration>
                    </MediaTime>
                  </AudioVisualSegment>
                  <AudioVisualSegment id="ID-SHOT-4c124f141dsk">

```

```

        <StructuralUnit
href="http://www.ebu.ch/metadata/cs/mpeg/avdp/StructuralUnitCS#10"/>
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            <MediaRelIncrTimePoint>146730</MediaRelIncrTimePoint>
            <MediaIncrDuration>3550</MediaIncrDuration>
        </MediaTime>
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        <MediaTime>
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            <MediaIncrDuration>6720</MediaIncrDuration>
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href="http://www.ebu.ch/metadata/cs/mpeg/avdp/StructuralUnitCS#10"/>
        <MediaTime>
            <MediaRelIncrTimePoint>157000</MediaRelIncrTimePoint>
            <MediaIncrDuration>2840</MediaIncrDuration>
        </MediaTime>
    </AudioVisualSegment>
    <AudioVisualSegment id="ID-SHOT-4c124f2128sk">
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        <MediaTime>
            <MediaRelIncrTimePoint>159840</MediaRelIncrTimePoint>
            <MediaIncrDuration>2000</MediaIncrDuration>
        </MediaTime>
    </AudioVisualSegment>
    <AudioVisualSegment id="ID-SHOT-4c124f2328sk">
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        </MediaTime>
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            <MediaIncrDuration>19960</MediaIncrDuration>
        </MediaTime>
    </AudioVisualSegment>
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