



A.I.-assisted automation of Subtitling and Localisation – Lessons Learned

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000. About Limecraft

Limecraft

- Incorporated May 2010
- Professional Video Production (High-end episodic, non-scripted, Archiving)
- Customers : producers, post facilities and broadcasters

An intelligent approach to Media Asset Management

- In the cloud if possible, local when necessary
- Harnessing AI for Ingest, logging, rough-cut,...
- Turn-key workflows for fiction, non-fiction, subtitling and localisation

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- facebook.com/Limecraft.connected
- twitter.com/limecraft





in: library

Q search

74 results



ALL FILES

✓ READY

⚠ NOT AVAILABLE

🔄 INGESTING

🚫 FAILED

📁 UNASSIGNED

COLLECTIONS

DD1

○ SCENE6

○ SCENE2

DD2

DD3

STORIES

SCREENPLAYS

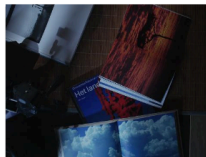
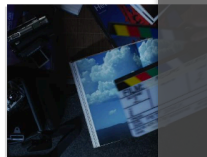
SCENE 1 | 3 takes in 1 shot

Shot 1.1 | 3 takes

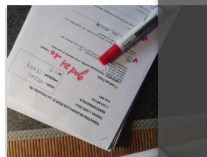
1.1.1 | P1080168.MOV
00:01:13:11 20/07/20151.1.3 | P1080172.MOV
00:00:50:10 20/07/20151.1.2 | P1080169.MOV
00:00:05:07 20/07/2015

SCENE 2 | 10 takes in 3 shots

Shot 2.1 | 4 takes

2.1.1 | P1080159.MOV
00:01:01:11 19/07/20152.1.4 | P1080157.MOV
00:00:25:11 19/07/20152.1.3 | P1080158.MOV
00:00:27:09 19/07/20152.1.2 | P1080161.MOV
00:01:09:15 19/07/2015

Shot 2.2 | 4 takes



Limecraft Flow



ADD CLIPS

Limecraft Flow

- Media Asset Management
- Automated workflow processing
- Configurable dashboard

Turn-key Workflows

- Automatically cuts Shots into Scenes
- Machine Transcription
- Auto-subtitling

Key Benefits

- Avoid human errors
- Cuts 30% of the post-production cost
- Faster turn around



Show All



channel4.jpg

The screenshot displays the ECLAIR software interface, which is used for managing video collections and workflows. The interface is divided into several sections:

- Left Sidebar:** Contains a tree view of collections and orders. Annotations point to "Rebranding" (top) and "Configurable collection structures and thesauri" (middle).
- Top Bar:** Shows the ECLAIR logo and the current project name "Productions / Limecraft test".
- Search Bar:** Located at the top center, with an annotation pointing to "Simple and advanced search".
- Advanced Filters Panel:** A pop-up window on the right side of the search bar, allowing for filtering by Type, Rating, Search in, Tags, and Uploader. An annotation points to "Export of selection" near the "EXPORT SEARCH RESULTS" button.
- Main Content Area:** Displays a grid of video clips. Each clip has a thumbnail, a title, and a duration. An annotation points to "Actions executable on a single clip or a selection of clips" near a clip's action menu.
- Bottom Section:** Displays a list of "Smart" Collections, which are used to control the workflow. An annotation points to "Smart Collections to control the workflow".
- Right Sidebar:** Contains a section for "Configurable import and export workflows", with an annotation pointing to it.

The screenshot displays the Aegis Subtitle Editor interface. On the left, a video preview window shows a close-up of yellow bells. A subtitle is overlaid on the video: "Ha. When the bell rings. We can see it as well as hear it." The video timeline at the bottom shows the current time as 00:00:08:00.

The main area is divided into two panels. The left panel shows a list of subtitle tracks. Track S2 is highlighted, showing the subtitle: "Ha. When the bell rings. We can see it as well as hear it." A red box highlights a note: "The subtitle has the following problems" with a bullet point: "The subtitle is 6.72 seconds long. Try to keep the subtitle visible for at most 5 seconds." The right panel shows the subtitle editor, where the same subtitle is being edited. The text "Look at this clock." is visible above the subtitle.

Annotations include blue circles and arrows pointing to various UI elements: the "EXPORT" button, the "MARK COMPLETE" button, the subtitle list, the subtitle editor, the video preview window, and the subtitle text.

The screenshot shows the EdApp video editor interface. On the left is a video preview window showing a yellow bell. A subtitle 'Ha. When the bell rings. We can see it as well as hear it.' is overlaid on the video. Below the video is a timeline with a playhead at 00:00:08:00. On the right is a subtitle editor window. It shows a list of subtitles. The subtitle 'Ha. When the bell rings. We can see it as well as hear it.' is selected and highlighted. A red box highlights a warning message: 'The subtitle has the following problems: The subtitle is 6.72 seconds long. Try to keep the subtitle visible for at most 5 seconds.' The interface also includes a top bar with 'BACK' and 'p0117smw.mp4', and a bottom bar with various editing controls like 'SET IN', 'SET OUT', and 'help'.

The screenshot displays the EdApp video editor interface. On the left, a video preview window shows a close-up of a clock with yellow bells. A subtitle 'Ha. When the bell rings. We can see it as well as hear it.' is overlaid on the video. The main area is the subtitle editor, which lists subtitles with their start and end times. The same subtitle is highlighted, and a red box points to a warning message: 'The subtitle has the following problems: The subtitle is 6.72 seconds long. Try to keep the subtitle visible for at most 5 seconds.' The bottom of the interface features a timeline with a playhead at 00:00:08:00 and a control bar with various editing tools.

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- How can we take advantage of A.I. tools that are available today?
 - How to select the right subset of information from the deluge of metadata generated by A.I. analytics?
 - How to deal with inaccuracies of the A.I. analytics?
 - How do we make the functionality of these A.I. tools easily available to production people?

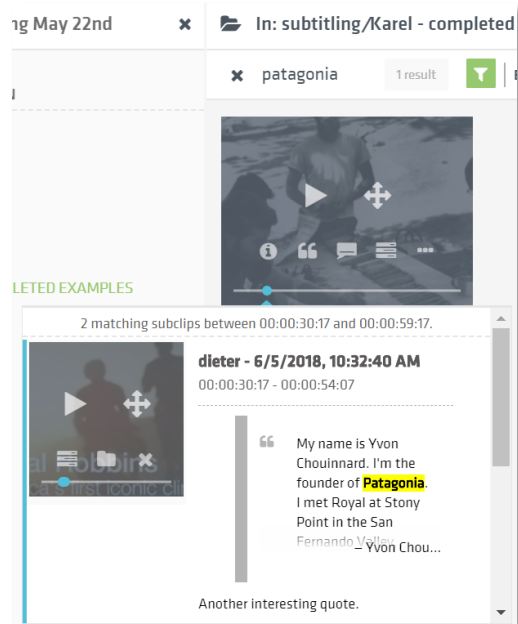
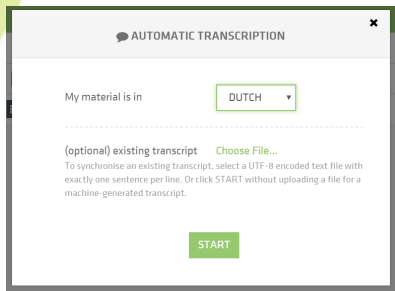
Use Cases

1. Metadata enrichment for cataloguing and better retrieval
2. A.I.-based methods for accessibility purposes
3. A.I.-based methods for localisation

Metadata enrichment for cataloguing and better material retrieval

-> Provide centralized and structured logging and transcription of material

- By means of full machine transcription (ASR) using optional manual corrections, or import an existing transcript and align with audio.
- Logging using the transcript
 - Get timecodes using text selection
 - Add remarks
 - Select material
 - Send to editing



Royal Robbins

America's first iconic climber

00:00:30:17

EXPORT

✓ COMPLETED

EXPORT

✓ MARK COMPLETE

Music

00:00:01:05

(music)

Alex Honnold

00:00:07:10

I'm Alex Honnold, and I think Royal Robbins is the man.

Yvon Chouinard

00:00:12:12

We used to call him the Icy Commander

Conrad

00:00:18:22

All of us who are in the sport today that make their living from it. We have a sense of gratitude to Royal for showing us the way.

Yvon Chouinard

00:00:30:17

My name is Yvon Chouinard. I'm the founder of Patagonia. I met Royal at Stony Point in the San Fernando Valley, where we kind off all learned to climb. We were lucky to be part of the golden age of Yosemite climbing. In 1964, Royal asked me to come along on the first ascent of the North American wall, El Capitan. You know, I had always told my parents that I was a climber, but they didn't know what that meant. Then one day looking at television on the nightly news, there was a helicopter going by the North American wall, and El Cap, and they zoom in on these crazy guys hanging from hammocks. My parents just about fell off the sofa. First time in their lives, they realise what climbing really meant.

When we did it was really the most ?? rock-climb that had been in anywhere. It was his idea to do that climb and he was definitely the leader.

Alex Honnold

00:01:40:17

I'm Alex Honnold, I'm a professional climber and I think Royal Robbins is the man.

I think Royal's legacy probably is clear. Climbing is his contribution to the clean climbing ethic where the challenge was more internal, in like, it's about the gear, less about, overcoming the mountain and more about, overcoming yourself and being able to challenge yourself on the inside. I'd heard from his family and some of his friends that he thought highly of muscle and stuff. And I can see why, because he sort of in the same spirit as, as what he was doing. It's pretty exciting to think that Royal Robbins, even like knows who I am, slash, like has an opinion on my climbing. It's pretty cool.

Voice-Over

00:02:40:24

Some ?? choose a life in i.t. or event planning. Conrad Anker has opted to swing from a nylon stensladder 19,000 feet up a cliff. It may seem an odd way to spend one's life, but it's his

search

3 results

6/5/2018, 10:32:40 AM

23.6s

dieter

00:00:30:17

00:00:59:17

My name is Yvon Chouinard. I'm the founder of Patagonia. I met Royal at Stony Point in the San Fernando Valley, where we kind off all learned to climb. We were lucky to be part of the golden age of Yosemite climbing. In 1964, Royal asked me to come along on the first ascent of the North American wall, El Capitan. You know, I had always told my parents that I was a climber, but they didn't know what that meant.

— Yvon Chouinard

#interesting_quote

1/14/2018, 4:54:20 PM

29s

dieter

00:03:27:22

00:03:35:15

I mean Royal was a classic American boy, there is no doubt about it. It's kind of, kind of a square. Yeah, he'd marry early and he had a wife,

— Yvon Chouinard

more quotes.

6/5/2018, 10:50:22 AM

7.7s

dieter

+ Add Subclip

#1 - Metadata enrichment for better material retrieval and cataloguing

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    },  
  ],  
}
```

Integration of Machine Transcription in Limecraft Flow

- Transcript output contains timings per detected word
 - We store confidence scores. This might help users in the future to perform corrections or quickly detect sections in which the transcription is worse than in others.
- ASR provides speaker segmentation and/or identification
- Best of Breed (incl. Google Speech API, Kaldi, ...) and consolidate individual formats into a unified transcription format.
 - Depending on the best expected result, we mix and match ASR engines per production and per language.
 - Or even need to fall back to manual transcription for certain types of content (e.g., children's interviews)

Auto-transcription is the basis for automatically generated subtitles

- Journalists, content producers who typically have no easy direct access or budget to subtitling
- Provide convenient tooling that is miles away from manual title creation in edit suites
- Move towards a widely adopted solution for organization-wide support for subtitling, including broadcaster and production companies
- Deliver subtitles in a variety of formats, including **EBU-TT-D**, SRT, STL, etc.





00:00:04:15

EXPORT

×

EXPORT

×

S0

00:00:00:02

Even if you feel like this is an area. That's a mystifying **just** by getting more knowledgeable. You can totally teach yourself how to be better than mine.

S10

00:00:19:20

My friends have money is definitely a case of what not to do I would receive text messages from my bank. Tiny. You're gonna bump painful. The buggery. You don't have a bank balance, Sarah. Number One take

S0

00:00:39:24

when I first started writing about this. You have to get a spreadsheet writers, although it's so much easier than it used to be dangling really smart at. There's actually no excuses for not knowing what's coming.

S10

00:00:56:09

It's really important for women everywhere to have a safety net. That means that you don't ever find yourself in a situation. You can't get out of whether it's a bad relationship when it's a job that you really don't like

S0

00:01:08:05

called it. The freedom fund and even if you are fiver a week, use in future. You see fit. It'll savings, but there's a real kind of emotional barn.

S14

00:01:22:24

We've all got busy lives often. It can be something that we can forget about it just like you know. Tidying your house every Saturday or something. Spend some time on managing your money. Sure. At your bank account and your mortgage could you be getting a better offer somewhere else. Are they put it right for you.

S10

00:01:43:03

We live in a culture where we are told we need. Sorry, many games, things Ruskin's thinking, Frank. It is. It's just not true make a list of what you really, really want and you'll see that a lot of stuff and spending money on is just not necessary.



Create subtitles

Do you want to use automatic transcription and subtitling to initialize your subtitles?

It takes about 1h for 1h of material.
Afterwards, you can edit the subtitles manually.

Have a transcript text available? Choose this option and we'll time-sync it to your material

START AUTOMATIC SUBTITLING

OR

Skip the automatic subtitling and start writing subtitles from scratch

SKIP

Generating subtitles is a bit of A.I. of itself

- Spotting rules have been encoded into the algorithm
 - Best score wins, but might violate some constraints
- Use the detected shot cut boundaries for subtitle alignment

WORKFLOWS

✓ Ingest

- ☒ Detect Type 03s
- ☒ Transcode to mp4 (SD) 02m09s
- ☒ Analyze media 01s
- ☒ Extract features 06m01s
- ☒ Analyzing audio waveform 0s
- ☒ Transcode to mp4 (720p) 03m55s

✓ Automatic Transcription

- ☒ Transcode 04s
- ☒ Automatic transcription 01m26s
- ☒ Generate Subtitles 48s

✓ Subtitles From Transcript

- ☒ Generate Subtitles 53s

Automatic Subtitler Spotting Rules

Tweak the behaviour of the automatic subtitler.

- A subtitle line preferably contains at most 37 characters, with a hard limit of 40 characters
- A subtitle preferably contains at most 2 lines, with a hard limit of 3 lines
- Keep the word rate below 180 words per minute
- When the gap between consecutive subtitles is less than 2 seconds, the first subtitle will be shown until the start of the next subtitle
- Snap the subtitle appearance timing to the shot change if it is closer than 0,5 seconds
- Fade out for 0,5 seconds after the last spoken word in the subtitle
- A subtitle preferably is between 2 and 5 seconds
- Prevent splitting these words from the next word (one word per line)

a
the
to
and
be



just by getting more knowledgeable, you can totally

DEMO

00:00:04:15

EXPORT

S0

Even if you
You can't

S10

My friend
from my
balance, Sarah. Number One take

S0

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S0

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We've all got busy lives often. It can be something that we can forget about it just like you know. Tidying your house every Saturday or something. Spend some time on managing your money. Sure. At your bank account and your mortgage could you be getting a better offer somewhere else. Are they put it right for you.

S10

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EXPORT SUBTITLES

Export subtitles as

EBU-TT-D

Export

The subtitle has the following problems

- The word rate is 316 words per minute. Show the subtitle longer on screen or make the text shorter to get the word rate below 180.

EXPORT

00:00:00:02 00:00:04:15

Even if you feel like this is an
area that's mystifying,

00:00:04:15 00:00:07:22

just by getting more
knowledgeable, you can totally

00:00:07:22 00:00:11:23

teach yourself how to be better than
money.

00:00:19:17 00:00:23:10

My experience with money is definitely
a case of what not to do. I would

00:00:23:10 00:00:29:06

receive text messages from my
bank, telling me

00:00:29:06 00:00:32:09

my bank balance is going to be far more
painful the longer you

00:00:35:15 00:00:36:10

don't look at your bank balance,
So number one take

00:00:36:10 00:00:36:12

One step further - machine translation for **Localisation**

- Translated subtitles serve a different purpose
 - Translated subtitles makes non-domestic content accessible to new audiences
 - No need for colours and annotations
- Prototype development supported by Creative Europe “Subtitlebot” project (1/1/2018 – 31/1/2019)





extremist policy and yet he is
very, very popular.

00:00:07:19

TRANSLATED FROM: fr

LANGUAGE: en

EXPORT

✓ MARK COMPLETE

Bonjour ce soir dans Décriptage
je vous emmène aux Philippines

00:00:00:22

00:00:03:19

Hello tonight in Decryption I take you
to the Philippines to learn

pour mieux connaître la méthode
Duterte. Le président philippin a

00:00:03:19

00:00:07:19

more about the Duterte method.
The Philippine president has a rather

une politique assez extrémiste et
pourtant il est très, très populaire.

00:00:07:19

00:00:11:01

extremist policy and yet he is
very, very popular.

Donc notre invité va nous aider
à comprendre pourquoi. Et si vous

00:00:11:01

00:00:14:10

So our guest will help us understand wh
And if you have any

aussi vous avez des questions à
poser sur Rodrigo Duterte et ses
questions about Rodrigo Duterte and his
fee free to submit them

00:00:14:10

00:00:18:09

méthodes, n' hésitez pas à nous les
soumettre sur la page Facebook et
to us in the show's Facebook and
Twitter page. We choose some

00:00:18:09

00:00:21:14

Twitter de l' émission. On en choisit
quelques-unes, on les pose à notre

00:00:21:14

00:00:24:21

of them, we ask them to our
guest. So it's at 7:10

00:01

00:02

00:03

00:04

00:05

00:06

00:07

00:08

00:09

00:10

00:11

00:12

00:13

00:14

00:15

00:16

Hello tonight in Decryption I take you to t...

Bonjour ce soir dans Décriptage je vous e...

more about the Duterte method. The Philippine president ...

pour mieux connaître la méthode Duterte. Le président phil...

extremist policy and yet he is very, very popular.

une politique assez extrémiste et pourtant il est ...

So our guest will help us understand why. And i...

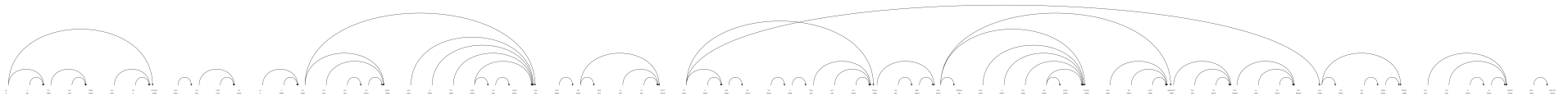
Donc notre invité va nous aider à comprendre p...

questions about Rodrigo Du

aussi vous avez des questio

Currently available in beta:

- New processing pipeline with
 - Subtitle processing dependent on chosen use case
 - Machine-learning-based translation services
 - NLP post-processing for optimizations for sentence/subtitle splitting.
- Extended Flow with support for different languages of subtitles and transcripts
- Dutch, English, French, Spanish, German, Italian, Polish, Portuguese, Russian





Available in beta now, we appreciate your feedback!

- Spotting rules should be optimised and configured per language for better presentation
- Optimise trade-off between length of the translation context vs. accuracy of the translation and timing.
- Take a free try: <https://platform.limecraft.com/#auth/signup>

Conclusions

- We're bringing A.I. technologies to the production environment in a way that adds value for end users
- Works great in a couple of cases
 - Transcription
 - Same-language subtitling for accessibility purposes
 - Translated subtitles for localisation purposes
- Saves > 50% of the cost and the turn around time
- Stay in touch and don't forget to register for a free try!

