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## Design of a Software Suite to Support Indexing, Annotating, and Analyzing Climbing Videos

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# DESIGN OF A SOFTWARE SUITE TO SUPPORT INDEXING, ANNOTATING, AND ANALYZING CLIMBING VIDEOS



Pierre Leroy Bruno Fruchard Thibault Goyallon Gaël Duprat Cécile Avezou Paul Dewilde Lionel Reveret



While capturing videos of sport performances is simple, retrieving a video requires an indexing system. Producing data that enable comparing athletes' performances also requires adapted tools. We collaborated with the **French climbing federation** to build a software suite that indexes videos, enables to annotate them, and provides interactive means to visualize them.



## Metadata and videos

we retrieve or produce data from official events to link to videos captured to facilitate navigation and retrieval challenges include video sizes and format to upload on servers while attending official events

### Video indexation



#### CHALLENGES

large quantities of data to store scattered across multiple devices

ways to link videos with data from performances for quick retrieval

tools for uploading videos in constraining contexts to centralize

#### SOLUTIONS

dedicated server using MongoDB with constant maintenance, GDPR compliant

923 videos for a total of 43.7 hours and 72GB

42 competitions covered, for 1232 single performances, and 3 disciplines (speed, boulder, and lead climbing)

### Data production



#### CHALLENGES

methods using image analysis still limited, so manual annotation required

tedious task requiring manpower and funds to annotate all performances of competitions

identifying significant factors to annotate to not waste time on unexploitable data

#### SOLUTIONS

dedicated annotation tool for lead climbing to produce quantitative and qualitative data

498 annotated videos with in average 156 [150, 162] annotations per video

30.3 minutes [28.6, 32.1] in average for annotating performances

### Data analysis



#### CHALLENGES

compare athletes' data with themselves or others over whole seasons or competitions

identify significant factors influencing the outcome of a performance

identify the benefits of an analytical interactive tool

#### SOLUTIONS

dashboards in Dash plotly designed in collaboration with the federation's analysts

support analysts to profile athletes and compare their performances

study competition and season outcomes to adapt training programs

## 1. SEARCH QUERY

Tour : Final Competition : IFSC - Climbing World Cup (L,S) - Chamonix (FRA) 2022

Année : Select... Style : Select...

Athlete : Select... Pays Ath : Select...

Style général : Select... Video : Select...

Annotations : Select... Commentaires : Select...

Style du tableau :  LEAD  BOULDER

RECHERCHER CLEAR

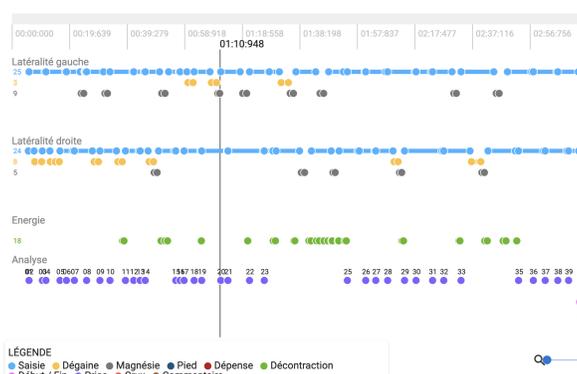
## 2. PERFORMANCES

Athlete	Score	Compétition	Tour	Style	Topo	Video	Annotation	Commentaire	Route
Adam Ondra	39.0+	IFSC - Climbing World Cup (L,S) - Chamonix (FRA) 2022	Final	LEAD Men	Oui	Oui	Terminé	Non	1
Taisei Homma	39.0+	IFSC - Climbing World Cup (L,S) - Chamonix (FRA) 2022	Final	LEAD Men	Oui	Oui	Terminé	Non	1
Sean Bailey	29.0+	IFSC - Climbing World Cup (L,S) - Chamonix (FRA) 2022	Final	LEAD Men	Oui	Oui	Terminé	Non	1
Luka Potocar	29.0+	IFSC - Climbing World Cup (L,S) - Chamonix (FRA) 2022	Final	LEAD Men	Oui	Oui	Terminé	Non	1
Yannick Flohe	29.0+	IFSC - Climbing World Cup (L,S) - Chamonix (FRA) 2022	Final	LEAD Men	Oui	Oui	Terminé	Non	1
Sam Avezou	25.0+	IFSC - Climbing World Cup (L,S) - Chamonix (FRA) 2022	Final	LEAD Men	Oui	Oui	Terminé	Oui	1
Hamish McArthur	25.0+	IFSC - Climbing World Cup (L,S) - Chamonix (FRA) 2022	Final	LEAD Men	Oui	Oui	Terminé	Non	1
Sascha Lehmann	20.0+	IFSC - Climbing World Cup (L,S) - Chamonix (FRA) 2022	Final	LEAD Men	Oui	Oui	E+S+L	Non	1
Satone YOSHIDA	12.0	IFSC - Climbing World Cup (L,S) - Chamonix (FRA) 2022	Final	LEAD Men	Oui	Oui	Terminé	Non	1
Janja Garnbret	TOP	IFSC - Climbing World Cup (L,S) - Chamonix (FRA) 2022	Final	LEAD Women	Oui	Oui	Non	Non	1
Laura Rogora	TOP	IFSC - Climbing World Cup (L,S) - Chamonix (FRA) 2022	Final	LEAD Women	Oui	Oui	Terminé	Non	1
Chaehyun Seo	TOP	IFSC - Climbing World Cup (L,S) - Chamonix (FRA) 2022	Final	LEAD Women	Oui	Oui	Terminé	Non	1
Jessica Pilz	TOP	IFSC - Climbing World Cup (L,S) - Chamonix (FRA) 2022	Final	LEAD Women	Oui	Oui	Terminé	Non	1
Natsuki Tani	45.0+	IFSC - Climbing World Cup (L,S) - Chamonix (FRA) 2022	Final	LEAD Women	Oui	Oui	Terminé	Non	1
Natalia Grossman	43.0+	IFSC - Climbing World Cup (L,S) - Chamonix (FRA) 2022	Final	LEAD Women	Oui	Oui	Terminé	Non	1
Brooke Rabouan	43.0+	IFSC - Climbing World Cup (L,S) - Chamonix (FRA) 2022	Final	LEAD Women	Oui	Oui	Terminé	Non	1
Mia Kramp	37.0	IFSC - Climbing World Cup (L,S) - Chamonix (FRA) 2022	Final	LEAD Women	Oui	Oui	Terminé	Non	1
JinBao LONG	5.11	IFSC - Climbing World Cup (L,S) - Chamonix (FRA) 2022	Final	SPEED Men	Non	Non	Non	Non	A
Erik Noya Cardona	5.49	IFSC - Climbing World Cup (L,S) - Chamonix (FRA) 2022	Final	SPEED Men	Non	Non	Non	Non	B
LIJUAN DENG	6.55	IFSC - Climbing World Cup (L,S) - Chamonix (FRA) 2022	Final	SPEED Women	Non	Non	Non	Non	A

## 3. VIDEO



## 4. MANUAL ANNOTATIONS



## 5. DATA ANALYSIS

