BETER SKILLS & TEAM PERFORMANCE STUDY

SOFTWARE QUALITY UPM RESEARCH
IN COLLABORATION WITH MIT

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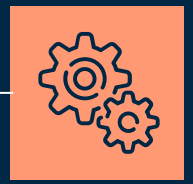
01

INTRODUCTION

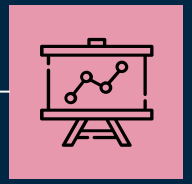
A brief description of the conceptual framework



02

METHODOLOGY

Detailed explanation of the situation and methods used



03

RESULTS

Statistical output of the study

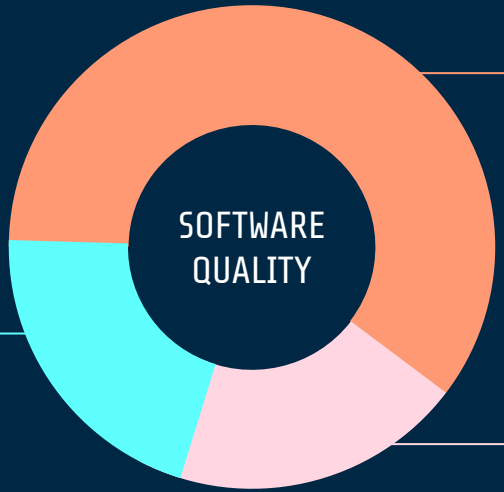
04

CONCLUSIONS

Synthesis of key points and practical techniques

01 INTRODUCTION

EXPLANATION OF THE SUBJECT



Theoretical

- 1st individual exam
- 2nd individual exam

Final group project

- Project document
- Project presentation

Group practice

- 12 group activities

COLLABORATION

hypothesis

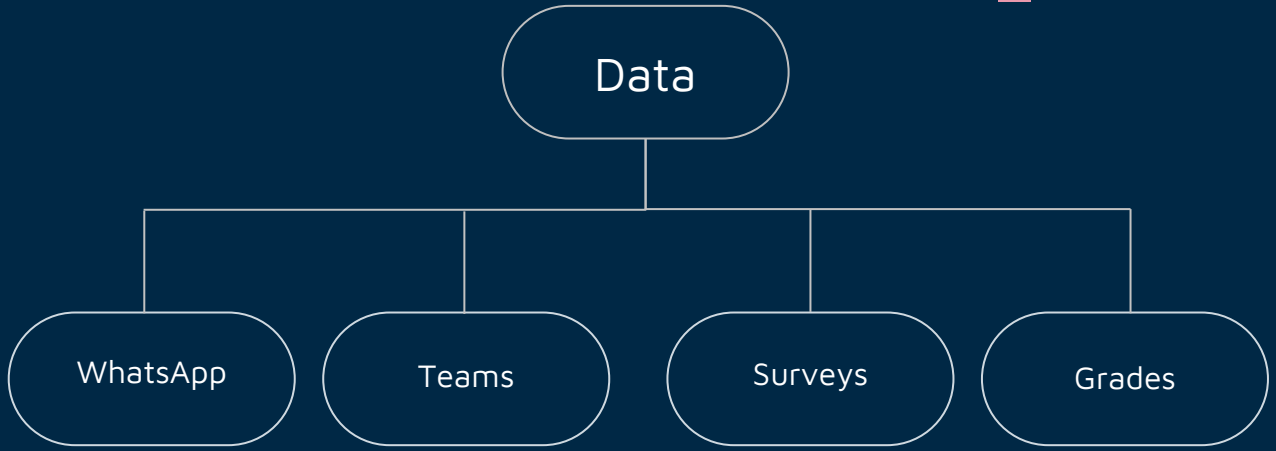
The more collaboration, the better performance

But how could we measure it?

To what extent does it affect overall performance?

How to improve entanglement?

RESEARCH RESOURCES



12 groups
60 College students

1 subject
4 sources of data

SURVEYS DETAILS

TEAM DIAGNOSTIC SURVEY

It is a well-validated instrument designed to diagnose the strengths and weaknesses of teams

HAPPIMETER.ORG

NEO-FFI

It assess personality in five main domains called OCEAN

DOSPERT

It is a psychometric scale that assesses risk-taking

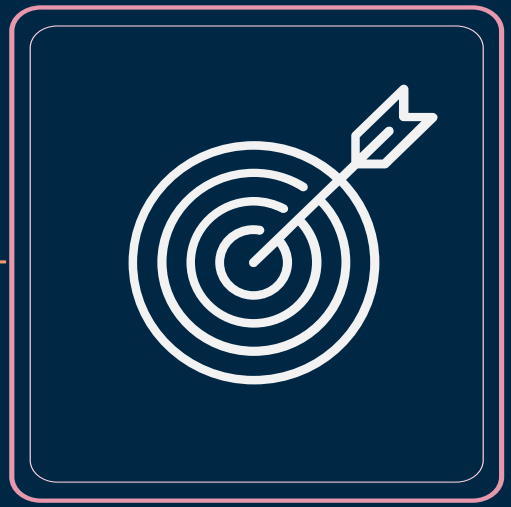
SCHWART

It is a questionnaire developed for assessing individual differences In values

MORALS

It is a powerful survey to understand and measure the attitude of individuals

PROJECT GOALS



01 Define clear metrics that indicate collaboration in a working group

02 Study the correlation between entanglement and overall performance

03 Clarify the importance of measuring interactions in a professional environment

02 METHODOLOGY

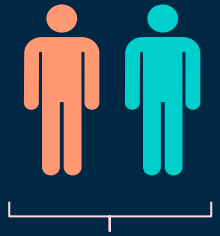
DATA STAGES

Obtain maximum data quantity and quality with the available resources
CLEANING
Extract features from the data for analysis
EXTRACTION
Unify and filter the data obtaining the required format
PROCESSING

02
01
EXTRACTION

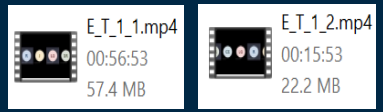
EXTRACTION OUTPUT

E: Extraction T: Teams
W: WhatsApp G: Grades



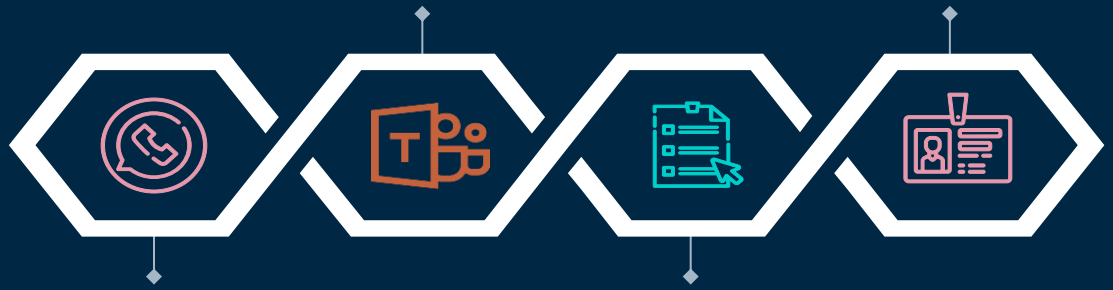
12 groups
60 students
2 languages

28 recordings (+20h)
E_T_IdGroup_IdVideo.mp4

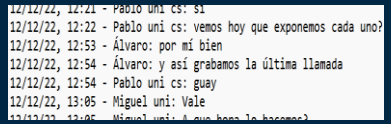


1 spreadsheet
E_G.csv

ID	Examen 1. NOTA (3)	Examen 2. NOTA (3)	TOTAL TEORÍA (6)	NOTA ACT # ACTS	NOTA ACT PRAC (2)	NOTA ACT COEVAL (1)	TRABAJO FINAL (1)	TOTAL CURSO
1	2.05	1.39	3.44	10	1.67	0.9	8	6.81
2	1.82	1.82	3.64	10	1.67	0.91	8	7.01
3	2.01	1.97	3.98	9	1.5	0.9	8	7.18
4	2.43	1.79	4.22	10	1.67	0.9	8	7.59
5	2.03	1.71	3.74	12	2	0.91	8	7.44
6	2.38	2.27	4.64	12	2	0.78	8.5	8.27



12 text files
E_W_IdGroup.txt



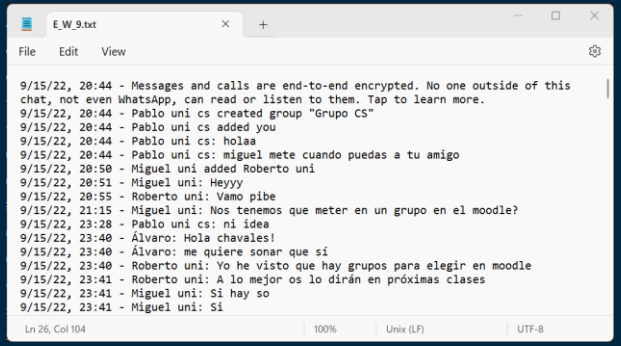
4 spreadsheet
E_S#.csv

id	timestamp	q1	q2	q3	q4	q5	q6	q7	q8	q9	q10	conservation	transcendence
5	########	3	6	5	7	8	5	4	1	1	4	-0.88	-1.92
6	########	1	8	4	5	6	8	8	0	2	0	-1.02	-0.8
13	########	4	5	4	7	8	2	2	1	1	2	-0.63	-2.48
15	########	1	4	4	6	8	8	8	1	1	5	-1.23	-0.22
17	########	6	5	8	6	8	4	7	5	6	7	1.27	-1.58
18	########	4	4	6	7	8	8	8	4	4	5	-0.23	-0.69
19	########	3	6	6	3	6	6	6	6	7	7	1.88	-0.46
20	########	7	7	7	7	7	7	7	7	8	6	1.67	-1.54
39	########	1	8	8	8	8	0	8	4	4	4	0.87	-1.79
40	########	1	4	6	7	8	8	8	5	6	7	0.34	0.11

02 CLEANING

WHATSAPP CLEANING

INPUT TEXT FILE



OUTPUT CSV FILE

Main tasks

- Select only the messages
- Exchange the name for the id
- Format date

C_W_9.csv

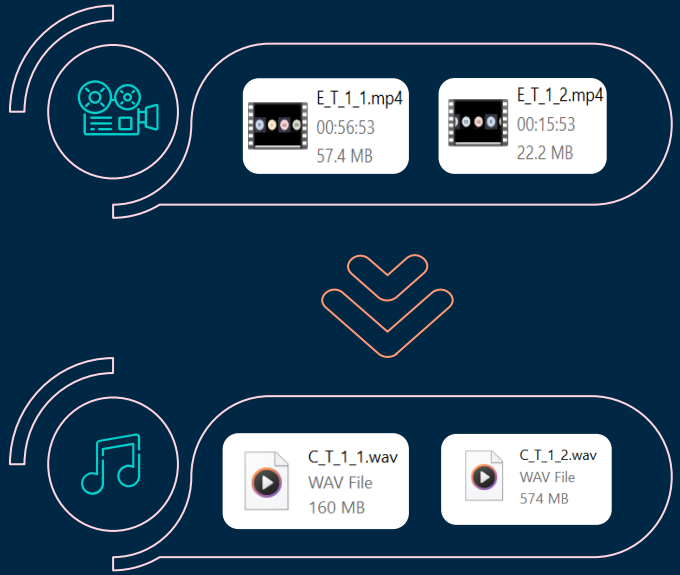
Datetime	IdStudent	Message
9/15/2022 20:44	8	holaa
9/15/2022 20:44	8	miguel mete cuando puedas a tu amigo
9/15/2022 20:51	9	Heyyy
9/15/2022 20:55	10	Vamo pibe
9/15/2022 21:15	9	Nos tenemos que meter en un grupo en el moodle?
9/15/2022 23:28	8	ni idea
9/15/2022 23:40	11	Hola chavales!
9/15/2022 23:40	11	me quiere sonar que sí
9/15/2022 23:40	10	Yo he visto que hay grupos para elegir en moodle
9/15/2022 23:41	10	A lo mejor os lo dirán en próximas clases
9/15/2022 23:41	9	Si hay so
9/15/2022 23:41	9	Si
9/15/2022 23:41	9	Metemos en este

SURVEYS CLEANING

surveys_individual_features.csv

ID	group	Id_happimeter	id_morals	harm_care_score	fairness_reciprocity_score	in_group_loyality_score	aut
1	1	XXXX	XXX	27	23	19	
2	1	XXXX	XXX	22	28	11	
3	1	XXXX	XXX	23	28	9	
4	1	XXXX	XXX	17	24	17	
5	1	XXXX	XXX	12	15	11	
6	2	XXXX	XXX	24	26	13	
7	2	XXXX	XXX	21	22	19	
8	2	XXXX	XXX	28	20	21	
9	2	XXXX	XXX	17	23	16	
10	2	XXXX	XXX	27	26	18	
11	3	XXXX	XXX	23	23	20	
12	3	XXXX	XXX	20	25	15	

TEAMS CLEANING



02
03
PROCESSING

WHATSAPP PROCESSING

GRIFFIN

SNA software part of the GalaxyLens product developed by Galaxy Sciences. It fetches the source data and calculates the Honest Signals

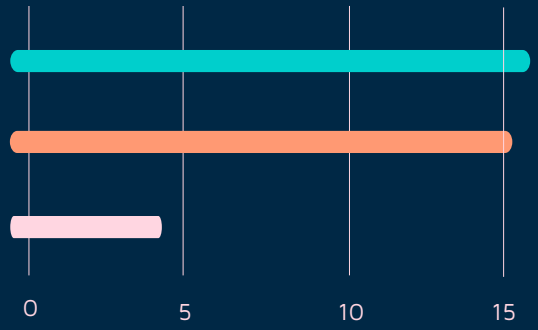
whatsapp_individual_features.csv

Used Griffin to extract features of each student

id	messages_sent	messages_received	contribution	ego_art	ego_nudges	alter_art	alter_nudges	sentiment_a	emotionality	complexity_a	influence_m	influence_to	influence_m	influence_to	contribution	activity_enta	A
1	34	153	-0.64	13.3285589	2.46857828	12.3425583	1.90392155	0.30356054	0.21556174	9.17950158	0.34612535	1.22759479	0.34613534	1.73062677	1	0.48764891	0
2	75	153	-0.34	7.77862688	1.36315185	9.69561111	3.79119051	0.2503955	0.2365071	9.30801089	0.42851578	0.99703557	0.23198133	1.98810769	2	0.39899419	0
3	38	153	-0.6	10.0637114	2.01008928	9.90327264	2.27012107	0.38186023	0.25401402	9.03412115	0.23606817	0.86659385	0.19915382	1.03894739	2	0.5014159	0
4	27	153	-0.7	11.9769211	2.33308825	7.53731201	1.56827653	0.25085172	0.25982842	9.55712002	0.48694678	2.01637115	0.4677544	1.15989512	2	0.49344262	0
5	22	153	-0.75	8.43701389	2.77708334	12.1060781	1.41848135	0.30559987	0.24428894	8.70027021	0.36035958	1.78005748	0.42167404	0.97007588	1	0.55532297	0
6	22	47	-0.36	13.264359	1.62884614	5.60930556	4.30416668	0.40461203	0.26875615	8.83185844	0.27577177	0.03090866	0.03090866	0.41276995	4	0.52000041	0
7	5	47	-0.81	0.08888889	4.33333333	1.1	1.16666667	0.53047645	0.26676442	6.5007369					3	0.57280099	0
8	8	47	-0.71	3.30270833	3.03750002	14.7608333	2.91249999	0.74679377	0.5797829	9.88272047	0	0.95989929	0.95989929	0	4	0.52947451	0
9	8	47	-0.71	20.9558333	3.86666664	16.2381944	2.29166669	0.42854989	0.23642459	9.14738464	0.06181731	0.25433899	0.12716949	0.06181731	1	0.51823687	0
10	24	47	-0.32	12.1329167	1.72083336	9.40025648	2.87179486	0.25926254	0.25381323	9.06703663	0.03761133	0.09844551	0.09844551	0.03761133	3	0.49702688	0
11	9	51	-0.7	4.09944444	2.9666667	1.50322222	2.00999999	0.41732964	0.1468538	8.67734657	0.90059644	0.17414143	0.08086523	2.24194098	4	0.54716958	0
12	14	51	-0.57	2.23914283	1.7057143	2.08133333	2.79333339	0.37459481	0.21416345	9.94641037	0.15937472	1.42221378	0.67376558	0.44129218	5	0.53297592	0
13	5	51	-0.82	1.41444444	1.31666668	0.26666667	1.53333333	0.39773412	0.22581228	10.3704529	0.05718198	0.35519399	0.2376607	0.05718198	4	0.54048215	0
14	13	51	-0.59	1.78	2.09333332	4.36766667	3.28000002	0.44323768	0.20723803	8.79444652	0.55765559	1.1049216	0.66567288	0.97198037	4	0.54497878	0
15	10	51	-0.67	1.74222222	3.03333335	2.68025394	1.53571429	0.28637576	0.20882915	9.33583593	0.30721797	1.39073241	0.53459943	0.57994234	3	0.54569344	0
16	7	51	-0.76	0.52666667	1.6	0.90277778	1.56333332	0.43669709	0.41661387	9.30275385	0.2924835	0.80982552	0.51962343	0.81247192	4	0.54995855	0
17	10	82	-0.78	2.97539681	3.55238096	1.74603174	3.39285715	0.400919	0.31971146	9.30576335	0.17108887	1.15612984	0.7020506	0.5354875	4	0.46078422	0
18	27	82	-0.5	2.20648148	2.56111105	1.08360193	3.57802208	0.31996323	0.26439703	9.1778439	0.41229667	0.59906571	0.22899635	0.85861146	5	0.43523154	0
19	45	82	-0.29	0.58665516	1.52143939	1.68794873	3.2923077	0.3819813	0.24578538	9.42392534	0.85095599	0.81362552	0.40605912	1.33567366	2	0.40809871	0
20	18	82	-0.64	0.99794873	4.95897444	2.24889978	2.33071892	0.24232499	0.29349721	8.80118516	0.28965403	1.00660386	0.50330193	0.76517656	3	0.43201452	0
21	4	18	-0.64	0.1	5	0.37777778	1.33333333	0.80524167	0.30466875	10.3429065	0.14538557	0	0	0.14538557	2	0.60339223	0
22	2	18	-0.8	0.15833333	1	0.6	2	0.00287704	0.25984994	8.2674551	0	1.29374316	1.20526963	0	2	0.53155082	0
23	4	18	-0.64	0.08333333	1.25	0.39166667	2.75	0.36067796	0.20365664	8.65379429	0.23746173	0	0	0.23746173	1	0.62075213	0
24	4	18	-0.64	0.52777778	4	0.28333333	2	0.46616809	0.21793332	7.6551671	1.11679611	0.08893287	0.08893287	1.11679611	2	0.60339223	0
25	8	18	-0.38	0.63333333	2	0.25833333	4.625	0.4529973	0.18023139	8.38984257	0.05537579	0.07751309	0.07751309	0.05537579	2	0.440848	0
26	35	82	-0.4	0.55625579	1.6097222	0.67623626	4.24175829	0.3564991	0.21624407	9.07579322	0.26271928	1.17914016	0.39699437	0.7311613	1	0.32094507	0
27	13	82	-0.73	0.55973214	4.42678571	0.60645833	2.27500004	0.43240507	0.3230531	8.46072515	0.17930828	1.04495116	0.22805284	0.83071929	0	0.39754167	0
28	18	82	-0.64	0.84691964	2.97053576	0.48185185	2.53888887	0.2322997	0.23437025	8.36169889	0.45930421	0.98801546	0.24739897	1.87294726	1	0.39504283	0
29	17	82	-0.66	0.57279762	3.92857146	0.88927083	2.71597219	0.21743349	0.23767841	8.49799904	0.26086974	1.0157783	0.3309085	0.81020702	1	0.41331456	0
30	20	82	-0.61	0.75378917	2.27350426	0.63567708	3.4375	0.29969237	0.28870239	8.10318798	0.30693399	1.00228955	0.43876405	0.98513975	1	0.39450367	0
31	10	66	-0.74	0.42198412	5.5	5.82222222	1.80952382	0.54165946	0.22817955	8.00716702	0	1.06608889	0.47688817	0	1	0.51529289	

WHATSAPP INDIVIDUAL FEATURES

35 FEATURES



TEXT EMOTION

4 emotions:
Happy, fear,
sad and anger

ARCHETYPES

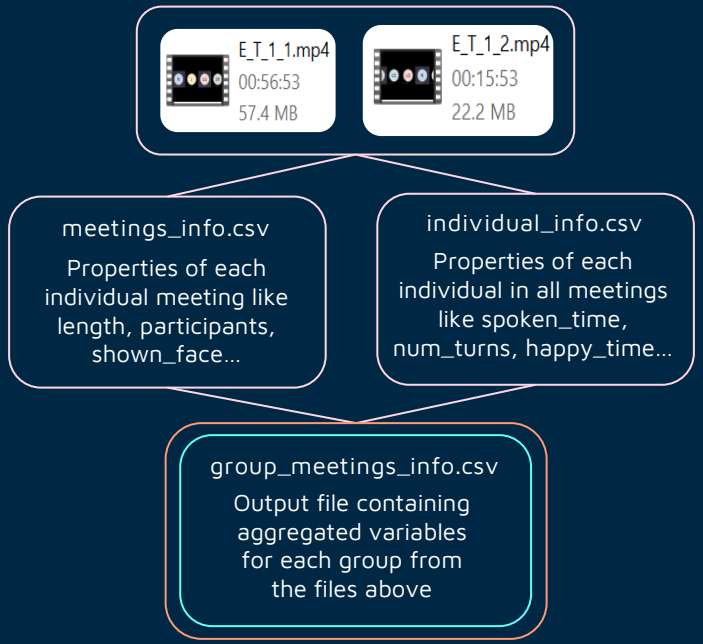
- Groupflow
- Alternative Realities
- Behavioral Values

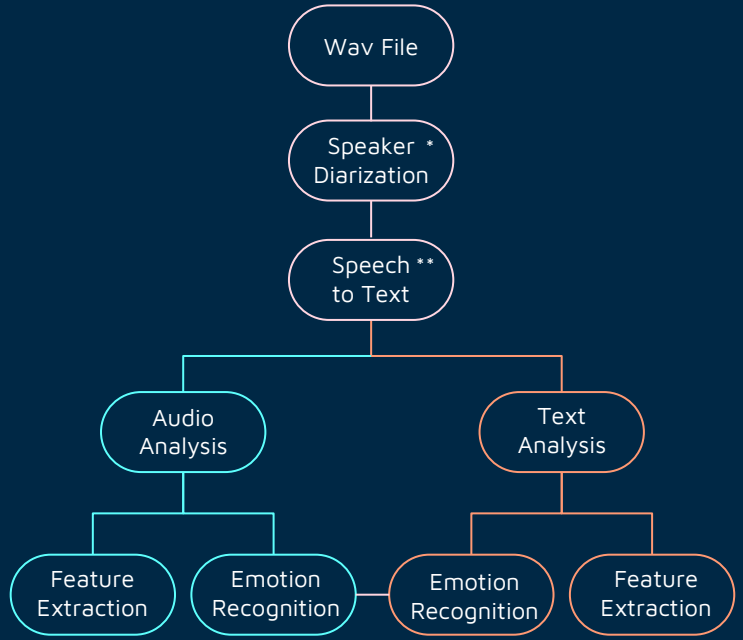
SOCIAL NETWORK ANALYSIS

- messages_sent
- contribution_index
- ego_art
- influence_total
- activity_entanglement

....

TEAMS PROCESSING v1





* https://github.com/pyannote/pyannote-audio.git

** https://github.com/openai/whisper.git

TEAMS PROCESSING v2

DIARIZATION

https://github.com/pyannote/pyannote-audio

TRANSCRIPTION

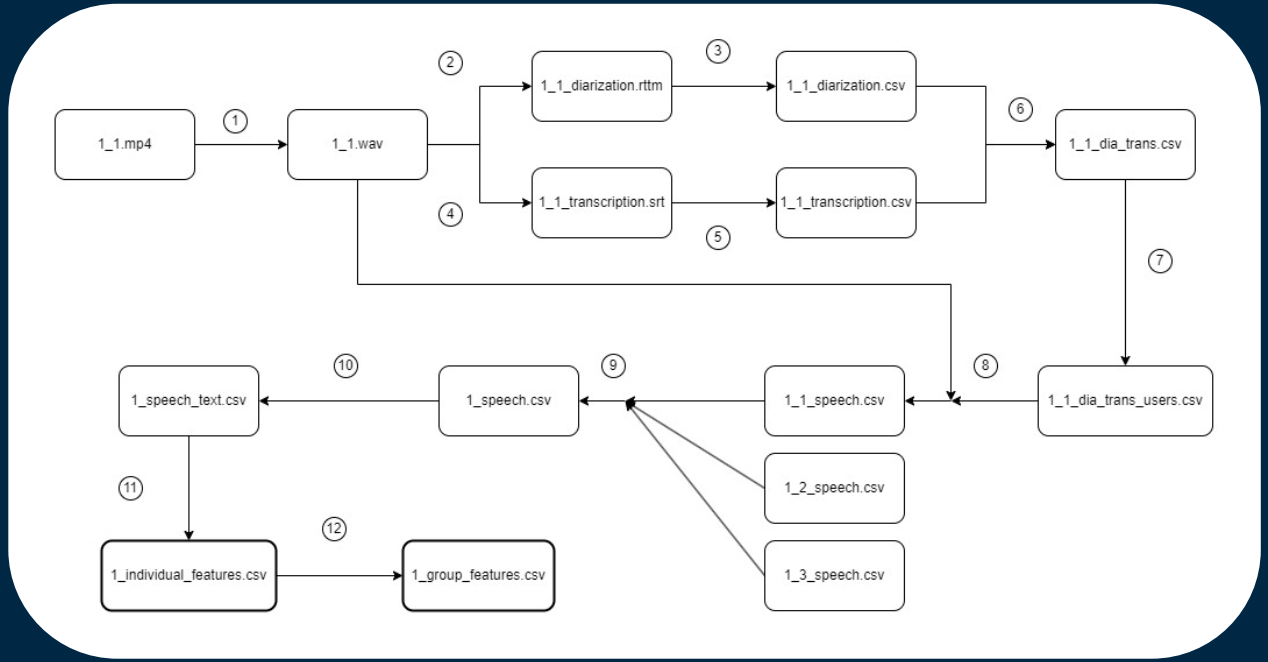
https://github.com/jianfch/stable-ts

SPEECH-EMOTION

https://huggingface.co/superb/wav2vec2-base-superb-er

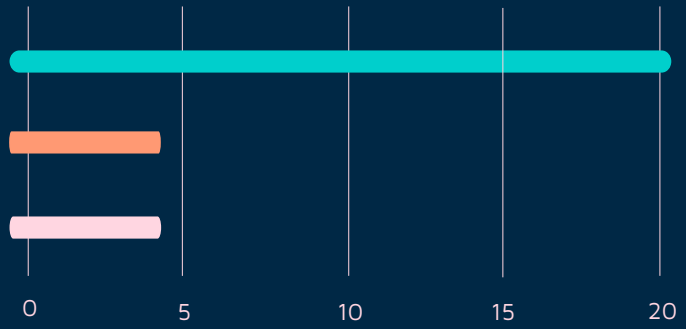
TEXT-EMOTION

https://huggingface.co/bert-base-multilingual-cased



MEETINGS INDIVIDUAL FEATURES

28 FEATURES



SPEECH EMOTION

4 emotions:
Happy, neutral, sad and anger

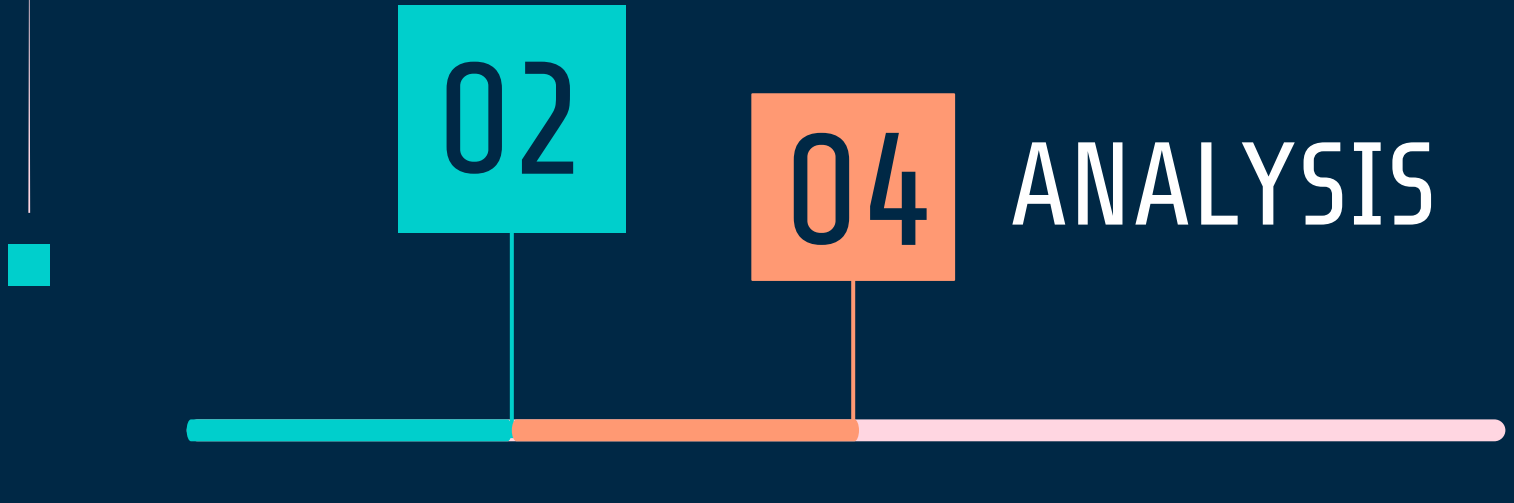
TEXT EMOTION

4 emotions:
Happy, fear, sad and anger

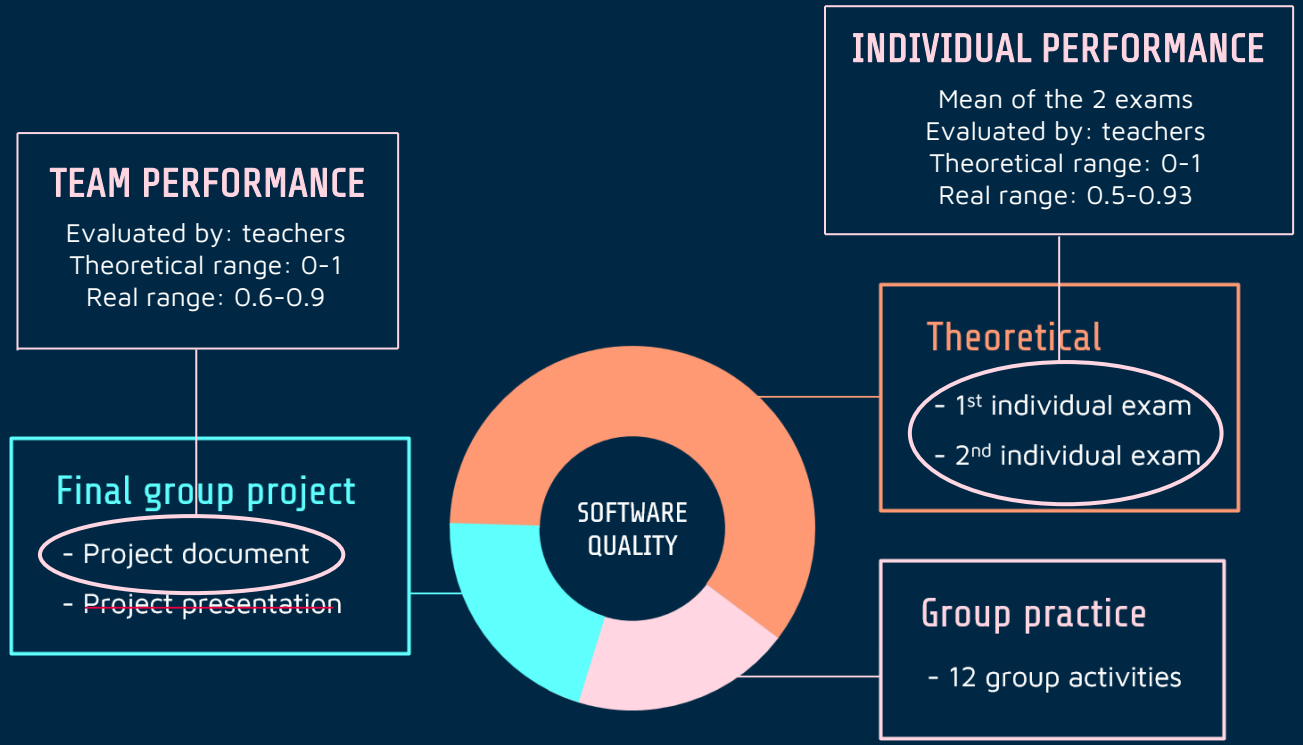
TURN ANALYSIS

- Individual_spoken_time
- avg_turn_duration
- max_time_without_speaking
- avg_turns_without_speaking
- avg_words_in_turn

....


02
04
ANALYSIS

OBJECTIVE VARIABLE



RESULTS 03

THE IMPORTANCE OF BEES IN TEAM PERFORMANCE

GROUPFLOW

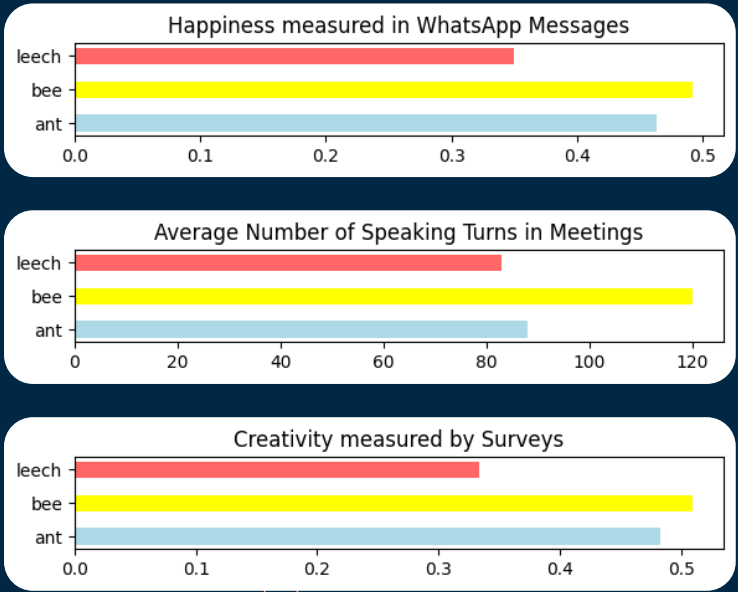
	Bee	Ant	Leech
Values	Self-transcendence self-direction/benevolence	Tradition/authority Conformity/security	Achievement/Power
Personality	Openness	Conscentiousness	(Neuroticism)
Morals	Fairness/care		Unfairness
Risk taking	Social risks	Financial/health risks	Ethical risks

(Table from Happimetrics)

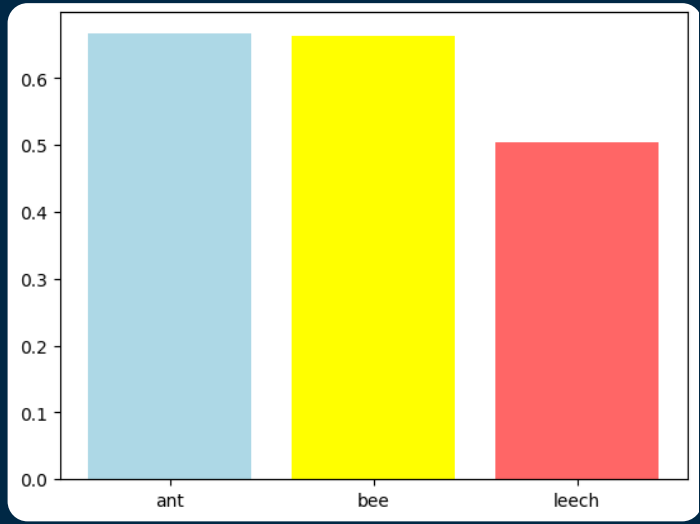
BEE ANALYSIS

LACK OF CONFIDENCE (PVALUE)

BEE TESTED CHARACTERISTICS

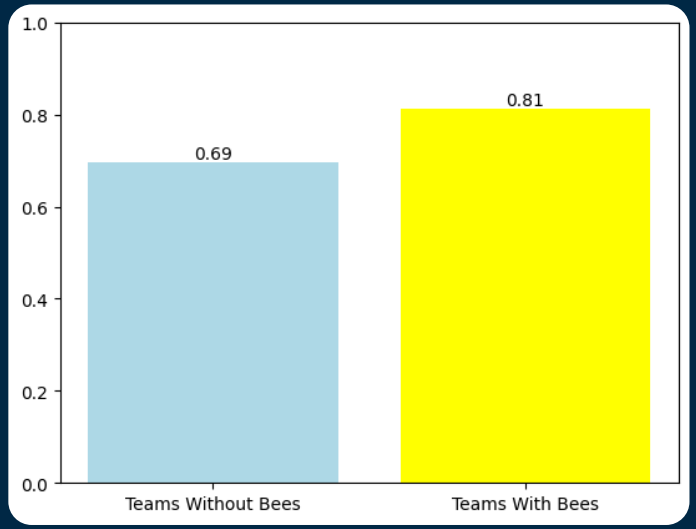


INDIVIDUAL PERFORMANCE

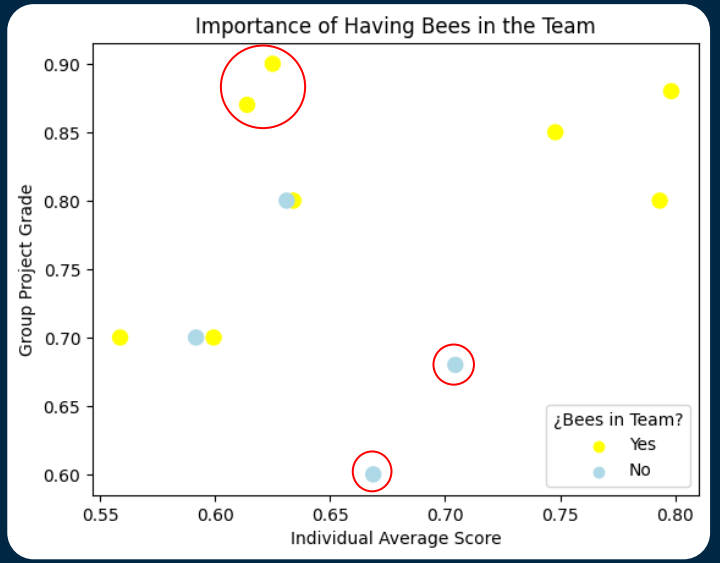


IMPLICATION IN PERFORMANCE

TEAM PERFORMANCE



INDIVIDUAL VS TEAM

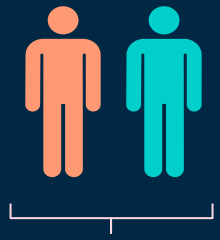


INDIVIDUAL PERFORMANCE PREDICTOR

MODEL PREPARATION

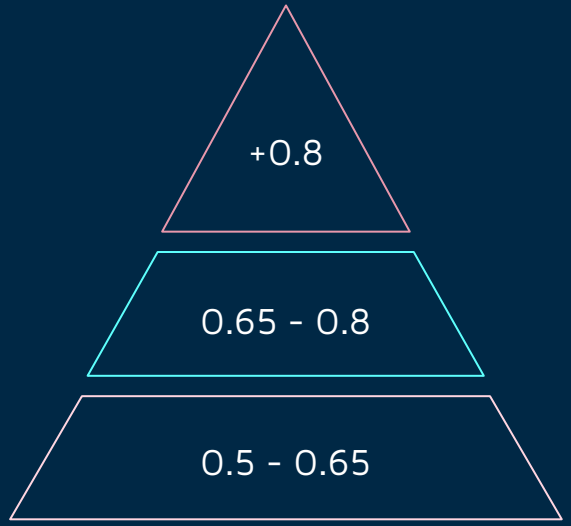
FEATURES

- Contribution Index Emotionally
- Happy Speech Spoken Time Ratio
- Health Likelihood Extraversion

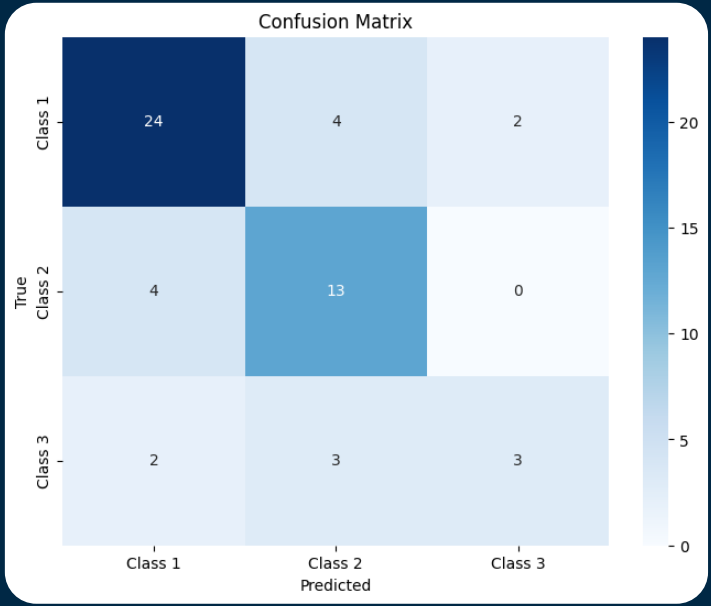


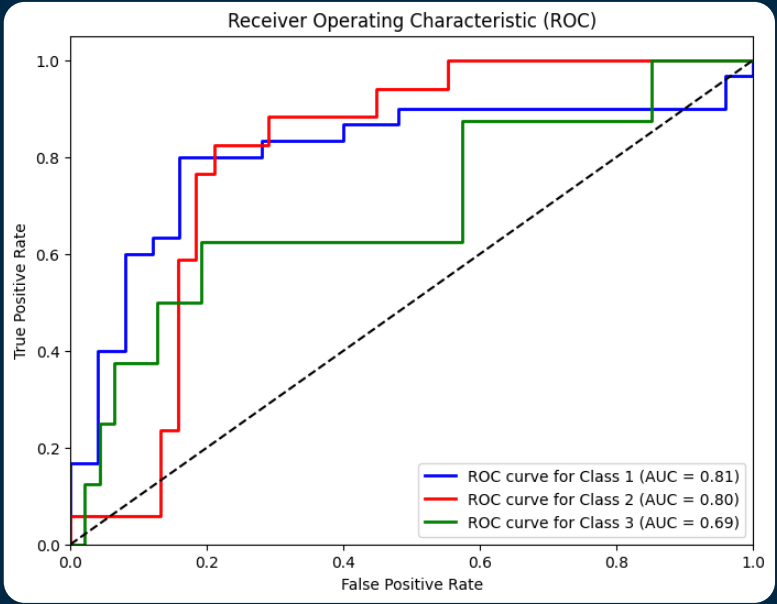
55 datapoints

CLASSES



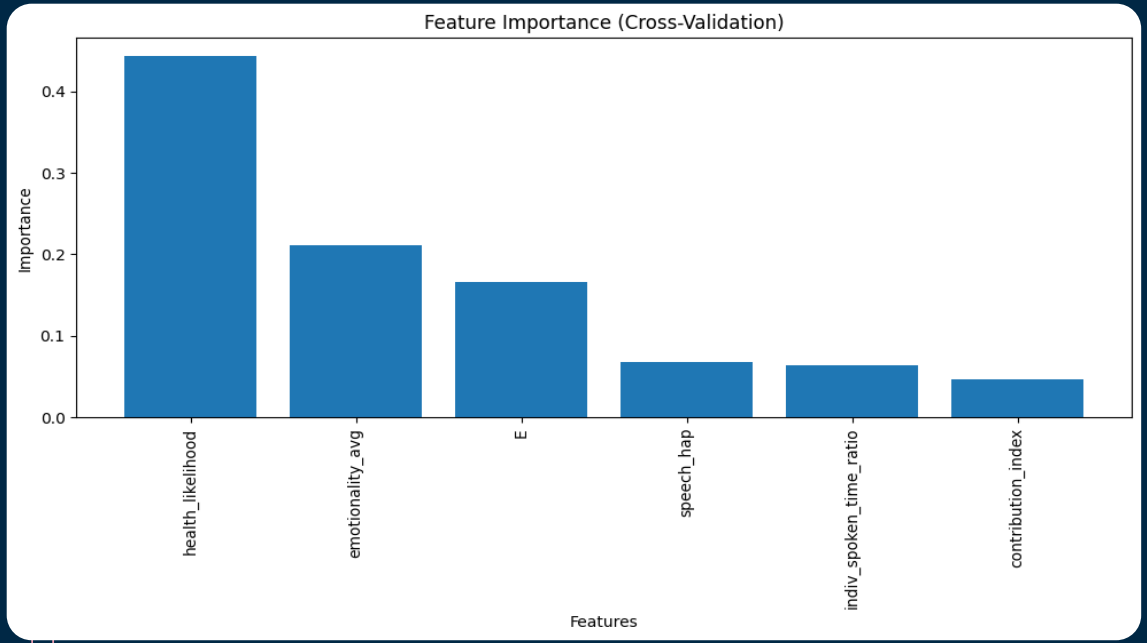
RESULT METRICS

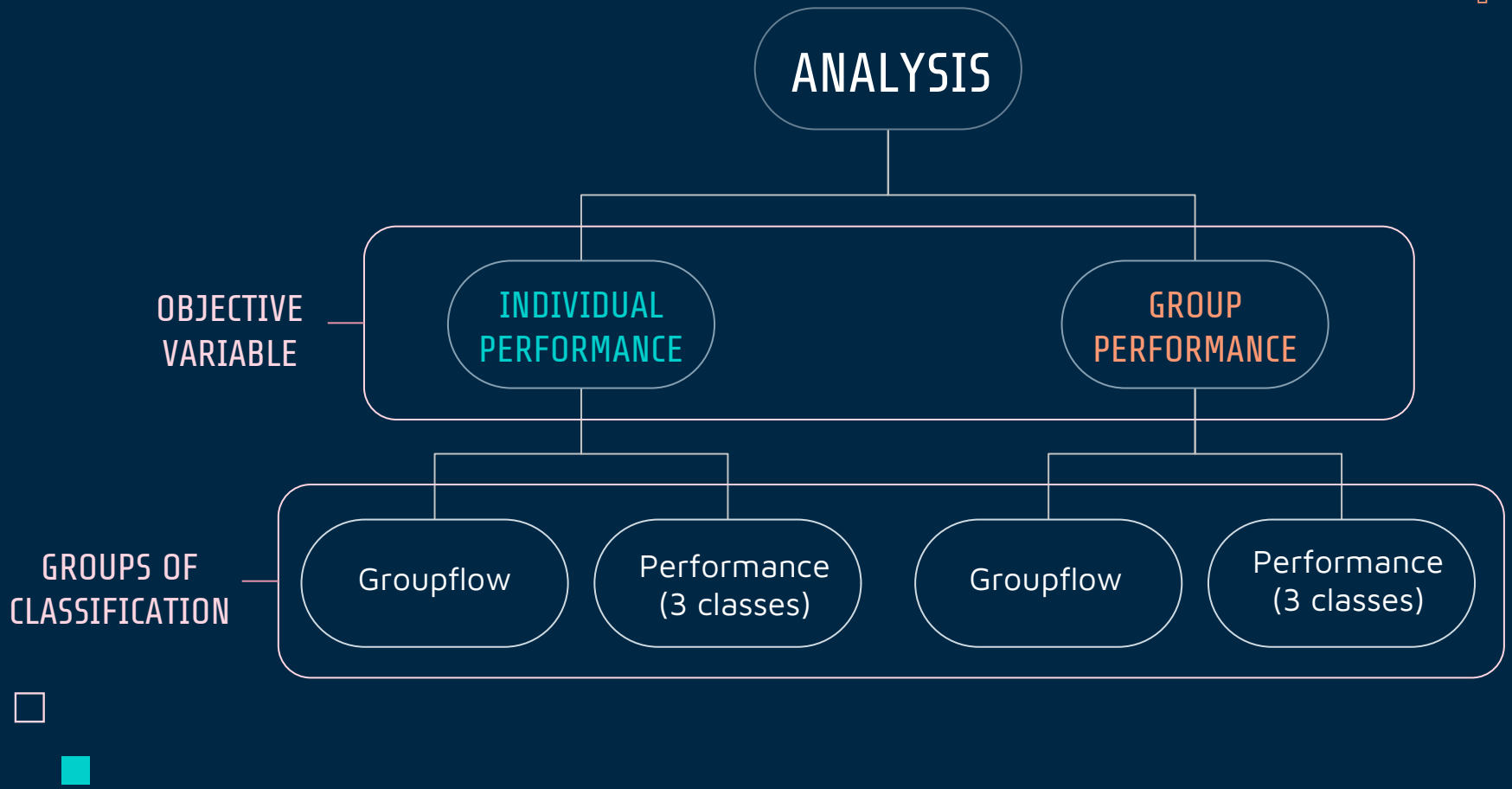


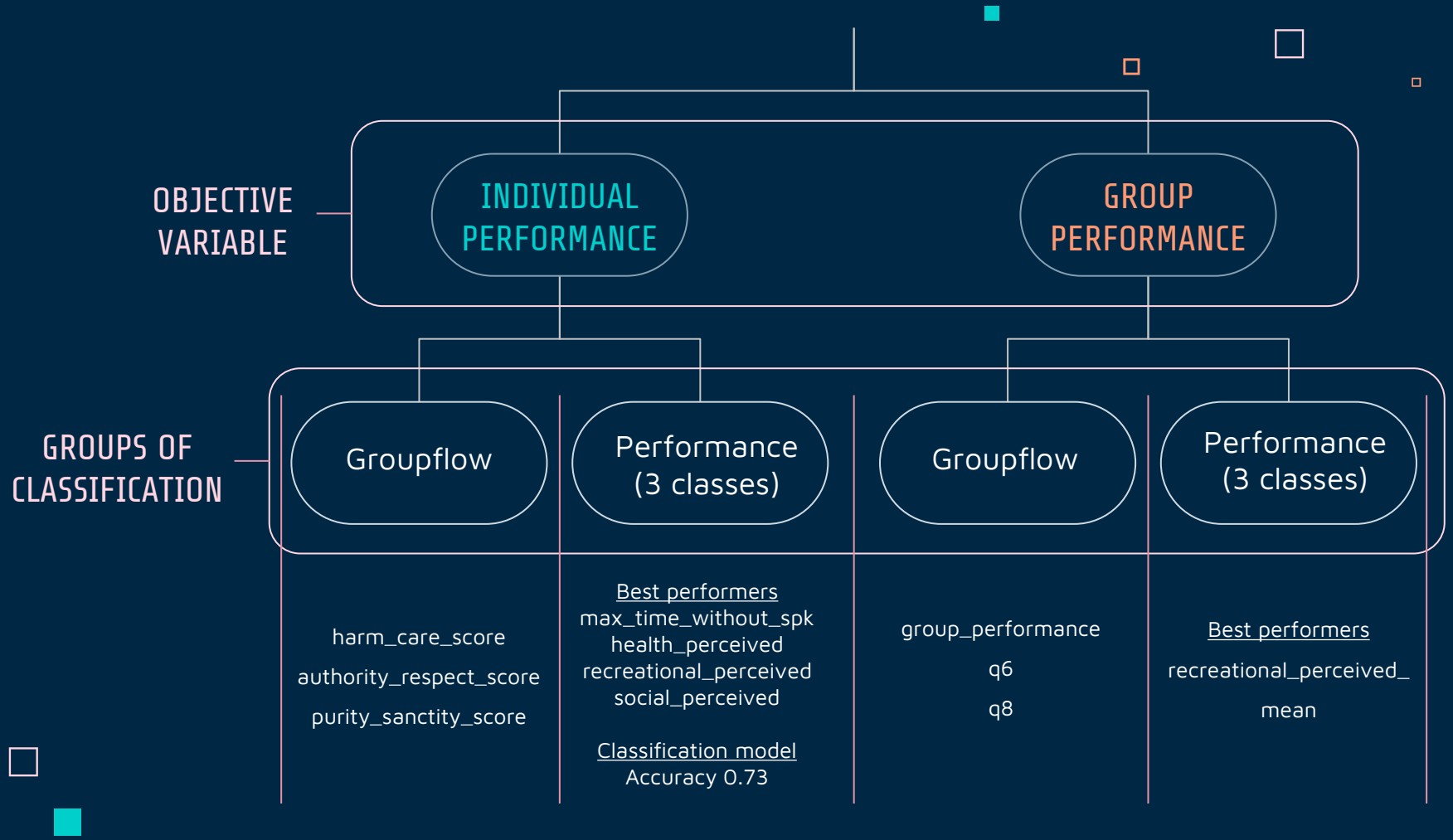


Mean Cross-Validation Accuracy: 0.73

FEATURE IMPORTANCE




ANALYSIS
OBJECTIVE VARIABLE
INDIVIDUAL PERFORMANCE
GROUP PERFORMANCE
GROUPS OF CLASSIFICATION
Groupflow
Performance (3 classes)
Groupflow
Performance (3 classes)


OBJECTIVE VARIABLE
INDIVIDUAL PERFORMANCE
GROUP PERFORMANCE
GROUPS OF CLASSIFICATION
Groupflow
Performance (3 classes)
Groupflow
Performance (3 classes)
harm_care_score
authority_respect_score
purity_sanctity_score
Best performers
max_time_without_spk
health_perceived
recreational_perceived
social_perceived
Classification model
Accuracy 0.73
group_performance
q6
q8
Best performers
recreational_perceived_
mean

NEXT STEPS

WRITE A PAPER

THANKS FOR YOUR TIME

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