
HKUCS Graduate Admission Data Analysis: A Multimedia Mining Approach

COMP4801

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Agenda

- Introduction
 - Methodology
 - Overall Structure
 - Audio Data Extraction
 - Visual Data Extraction
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- Information Analysis
 - Data Selection
 - Numerical Data Model
 - Result Prediction
 - Data Mining Model
 - Conclusion
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 - Q&A

Introduction

HKUEDM Reynold Cheng

Reynold Cheng
Online

Search

MAIN NAVIGATION

- Dashboard
- Visualization Options
- Analysis Options
- Multimedia Analysis
- Facial Expressions
- Speech - TFIDF
- Speech - BagofWords
- Speech - BiBagofWords
- Filtering
- Prediction

Prediction Table
Parameterization Method: TFIDF

Predicted Result
Show 25 entries

ID	year	apply_for	qs_ug	gpa_ug	real result	predicted result
Y15Q03	Y15	either	425	3.56	rejected	rejected(True)
Y16D04	Y16	either	225	3.7	rejected	rejected(True)
Y16D07	Y16	mphil	225	3.88	rejected	rejected(True)
Y16G01	Y16	phd	75	3.35	rejected	rejected(True)
Y16K02	Y16	phd	75	3.76	rejected	admitted
Y16K03	Y16	phd	75	3.54	rejected	rejected(True)
Y16K08	Y16	phd	650	3.85	admitted	admitted(True)
Y16L05	Y16	phd	650	3.23	rejected	rejected(True)
Y16M03	Y16	phd	175	3.81	rejected	rejected(True)
Y16M09	Y16	mphil	175	3.27	rejected	rejected(True)
Y16Q01	Y16	either	425	3.48	rejected	rejected(True)
Y16Q02	Y16	either	650	3.46	rejected	rejected(True)
Y16S01	Y16	either	375	3.73	rejected	rejected(True)
Y16S06	Y16	phd	375	3.8	rejected	rejected(True)
Y16Z03	Y16	phd	650	3.32	rejected	rejected(True)
Y16Z04	Y16	mphil	650	3.7	rejected	rejected(True)
Y16Z27	Y16	phd	225	3.5	admitted	rejected

Showing 1 to 17 of 17 entries

Previous 1 Next

Training Material

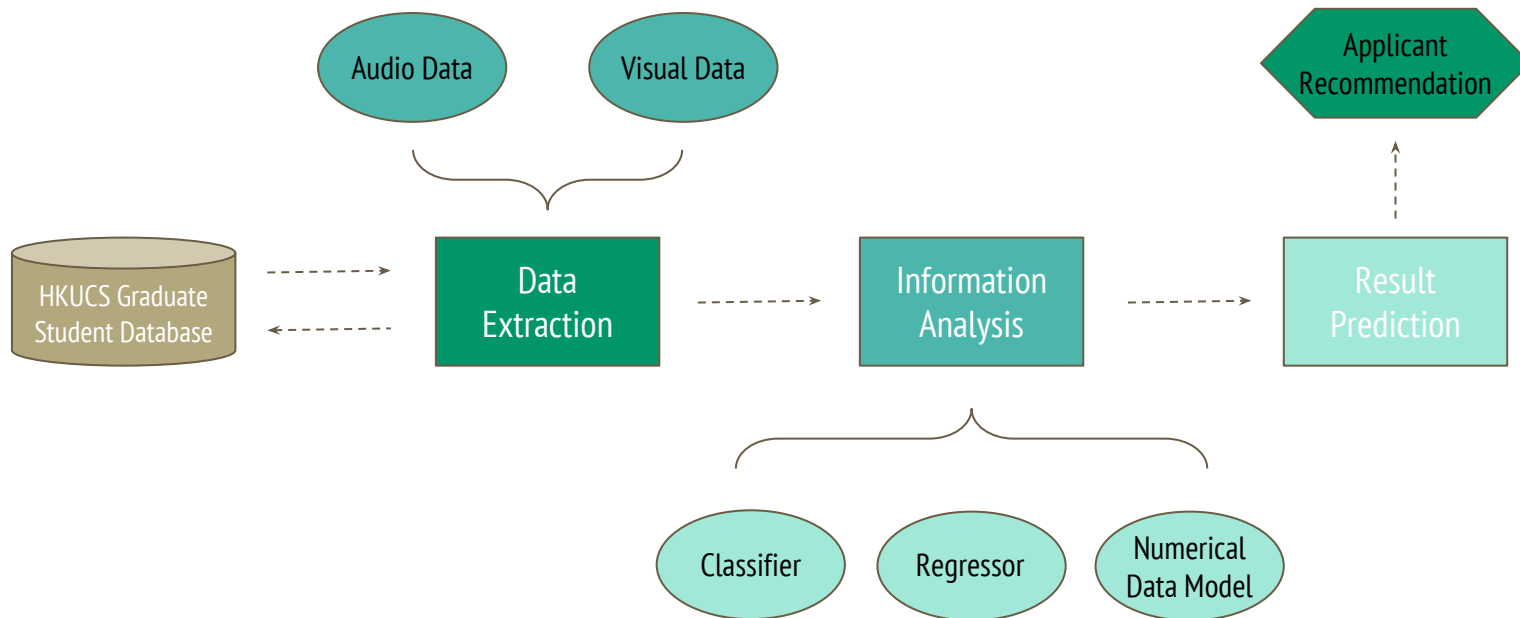
ID year apply_for qs_ug gpa_ug

ROC Curve
Admission Prediction Comparison
TFIDF + RandomForestRegressor

Table Information
Accuracy: 0.8823529411764706
Learning Time Spent: 0.036087989807128906s

Methodology

Overall Structure

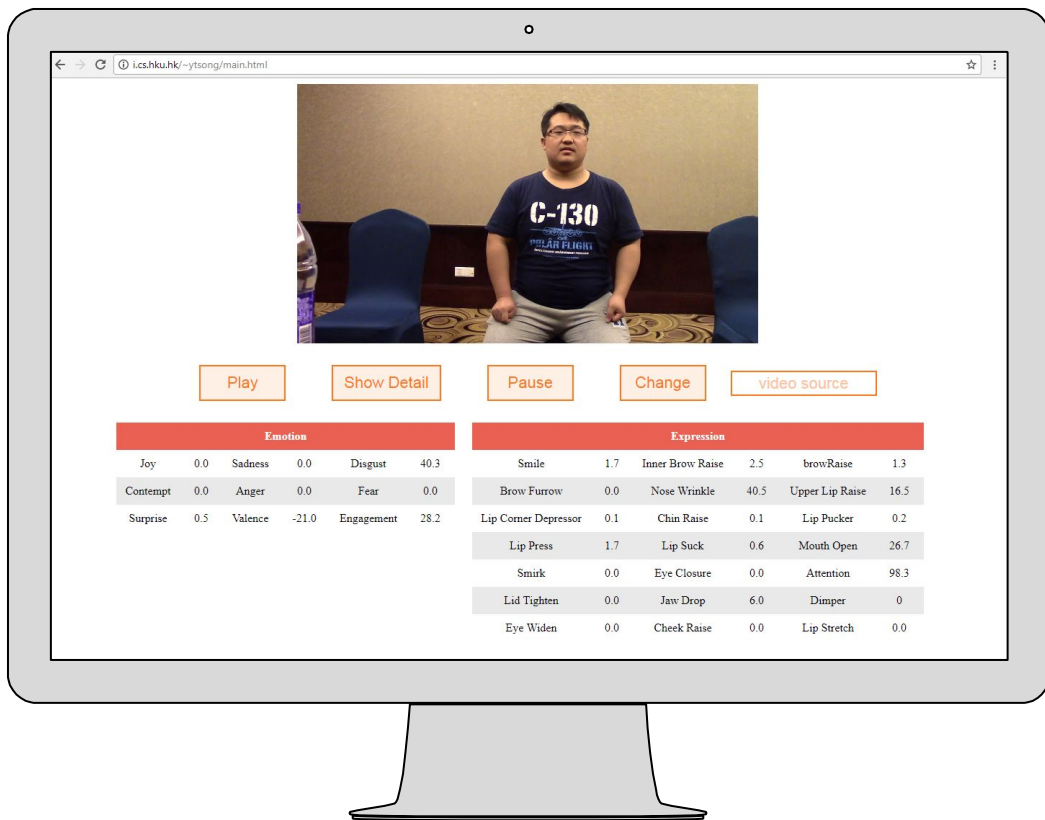


Audio Multimedia Data Extraction

- Google Speech Recognition API
- Google Cloud Speech Recognition API
- PocketSphinx

```
>python3 transcribe_2017.py
-----round_8_id_518_videoId_167_Z03-----
pixel art okay so are you watching Envoy underarm Brown University electrical
engineering and also add to Illinois University of Washington navigate
what's the latest College I wait for my going to work today Bentley online s
you want for pool okay Point beaches for texting people only if you will st
rt your PhD
show me some all you have other research interest and I have no idea Papa ok
y I can throw up remember yeah I had a phone for a week
could you can you work at all see the other universities red wedding reactio
Google make a list
```

Visual Multimedia Data Extraction



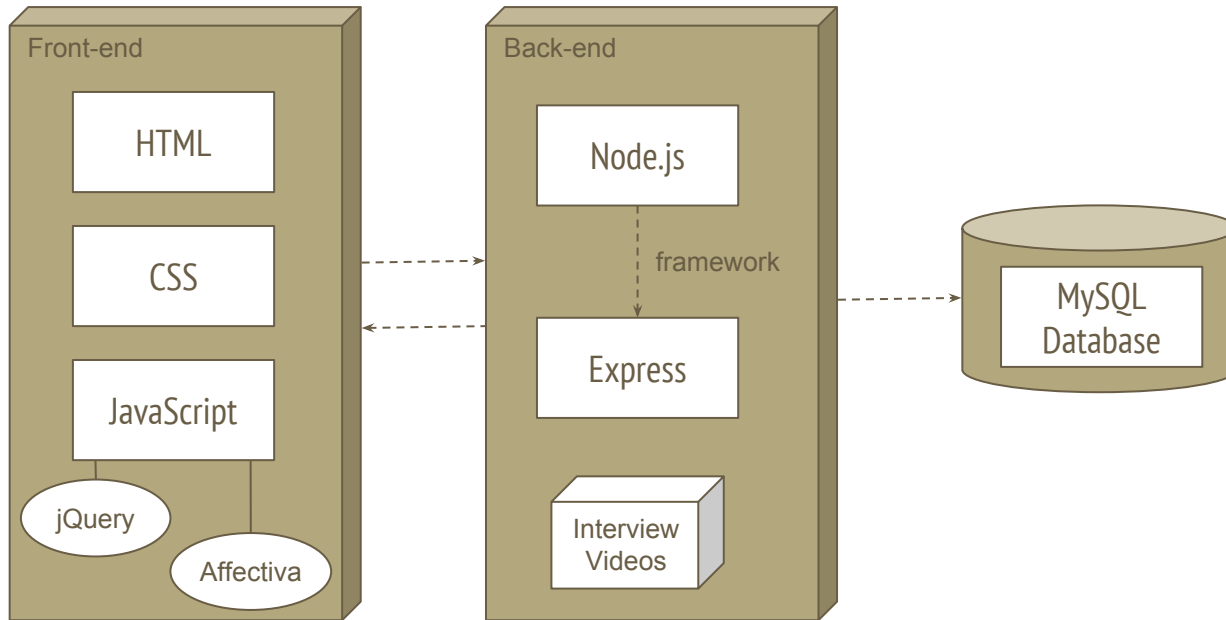
The application interface displays a video of a man sitting on a chair. Below the video, there are control buttons: Play, Show Detail, Pause, Change, and a video source input field.

The application displays two tables of extracted data:

Emotion					
Joy	0.0	Sadness	0.0	Disgust	40.3
Contempt	0.0	Anger	0.0	Fear	0.0
Surprise	0.5	Valence	-21.0	Engagement	28.2

Expression					
Smile	1.7	Inner Brow Raise	2.5	browRaise	1.3
Brow Furrow	0.0	Nose Wrinkle	40.5	Upper Lip Raise	16.5
Lip Corner Depressor	0.1	Chin Raise	0.1	Lip Pucker	0.2
Lip Press	1.7	Lip Suck	0.6	Mouth Open	26.7
Smirk	0.0	Eye Closure	0.0	Attention	98.3
Lid Tighten	0.0	Jaw Drop	6.0	Dimper	0
Eye Widen	0.0	Cheek Raise	0.0	Lip Stretch	0.0

Visual Multimedia Data Extraction



Affectiva API & MySQL Database

facial_expression

Column	Type
◇ ID	varchar(50)
◇ second	decimal(7,2)
◇ typeID	int(11)
◇ emotionID	int(11)
◇ expressionID	int(11)
◇ performance	int(11)

type

Column	Type
◇ ID	int(11)
◇ name	varchar(30)
◇ description	text

emotion

Column	Type
◇ ID	int(11)
◇ Joy	int(11)
◇ Sadness	int(11)
◇ Disgust	int(11)
◇ Contempt	int(11)
◇ Anger	int(11)
◇ Fear	int(11)
◇ Surprise	int(11)
◇ Valence	int(11)
◇ Engagement	int(11)

expression

Column	Type
◇ ID	int(11)
◇ Smile	int(11)
◇ InnerBrowRaise	int(11)
◇ BrowRaise	int(11)
◇ BrowFurrow	int(11)
◇ NoseWrinkle	int(11)
◇ UpperLipRaise	int(11)
◇ LipCornerDepressor	int(11)
◇ ChinRaise	int(11)
◇ LipPucker	int(11)
◇ LipPress	int(11)
◇ LipSuck	int(11)
◇ MouthOpen	int(11)
◇ Smirk	int(11)
◇ EyeClosure	int(11)
◇ Attention	int(11)
◇ LidTighten	int(11)
◇ JawDrop	int(11)
◇ Dimpler	int(11)
◇ EyeWiden	int(11)
◇ CheekRaise	int(11)
◇ LipStretch	int(11)

Information Analysis

Data Selection

1. Sufficient Sample

- Audio: with a length of more than 5 seconds
- Visual: more than 100 samples in total, 20 samples in self-introduction

2. Clear Contents

- Visual: self-introduction part

Numerical Data Model

- Bag-of-words
- Bigram bag-of-words
- Tf-idf
- Word2Vec

(1) She majors in Software Engineering.

(2) Peter also majors in Software Engineering.

“She”, “majors”, “in”, “Software”, “Engineering”

“Peter”, “also”, “majors”, “in”, “Software”, “Engineering”

BoW1 =

{“She”: 1, “majors”: 1, “in”: 1, “Software”: 1, “Engineering”: 1,
“Peter”: 0, “also”: 0}

BoW2 =

{“Peter”: 1, “also”: 1, “majors”: 1, “in”: 1, “Software”: 1,
“Engineering”: 1, “She”: 0}

Numerical Data Model

- Bag-of-words
- Bigram bag-of-words
- Tf-idf
- Word2Vec

(1) She majors in Software Engineering.

(2) Peter also majors in Software Engineering.

(“She”, “majors”), (“majors”, “in”), (“in”, “Software”),
 (“Software”, “Engineering”)

(“Peter”, “also”), (“also”, “majors”), (“majors”, “in”), (“in”,
 “Software”), (“Software”, “Engineering”)

Numerical Data Model

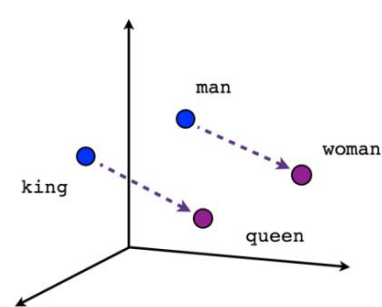
- Bag-of-words
- Bigram bag-of-words
- Tf-idf
- Word2Vec

	in_tfidf	so_tfidf	a_tfidf	is_tfidf
0	26.787939	258.314955	22.292716	10.458095
1	39.151603	329.430004	41.400758	10.458095
2	13.393970	219.620003	25.477389	14.641334
3	41.212214	271.910479	24.415832	12.549714
4	30.909160	255.177527	31.846737	20.916191
5	34.000077	253.085908	35.031410	11.503905
6	12.363664	227.986479	25.477389	15.687143
7	31.939466	208.116098	12.738695	15.687143
8	20.606107	113.993239	4.246232	1.045810
9	7.212137	39.740762	2.123116	2.091619
10	16.484886	100.397715	11.677137	9.412286
11	9.272748	75.298287	6.369347	7.320667
12	17.515191	311.651242	29.723621	18.824572
13	7.212137	124.451335	19.108042	6.274857
14	8.242443	111.901620	10.615579	7.320667
15	18.545496	312.697051	21.231158	18.824572
16	10.303053	134.909430	12.738695	5.229048
17	9.272748	125.497144	9.554021	3.137429
18	5.151527	145.367526	10.615579	6.274857
19	1.030305	4.183238	0.000000	0.000000
20	8.242443	89.939620	4.246232	1.045810
21	17.515191	110.855811	12.738695	6.274857

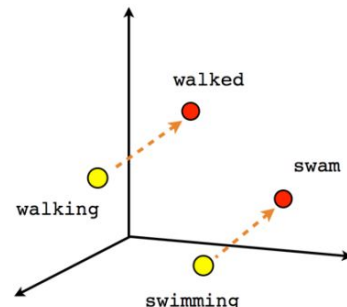
Numerical Data Model

- Bag-of-words
- Bigram bag-of-words
- Tf-idf
- Word2Vec

- ☐ identify the word as word vectors
- ☐ numeric presentation projects the relevance of the words



Male-Female

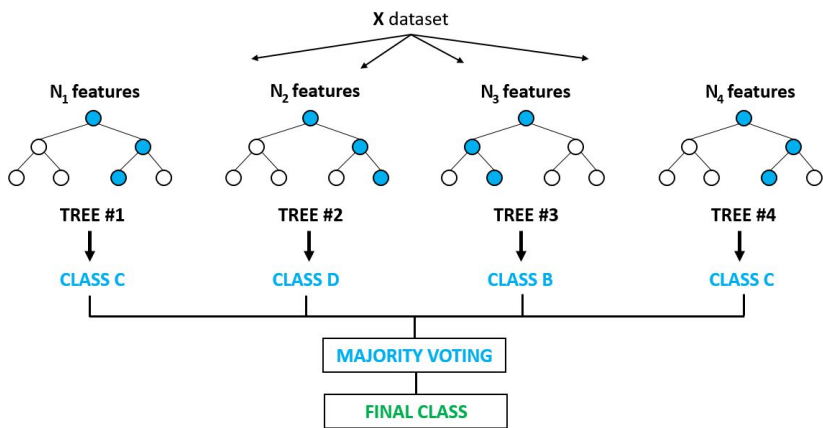


Verb tense

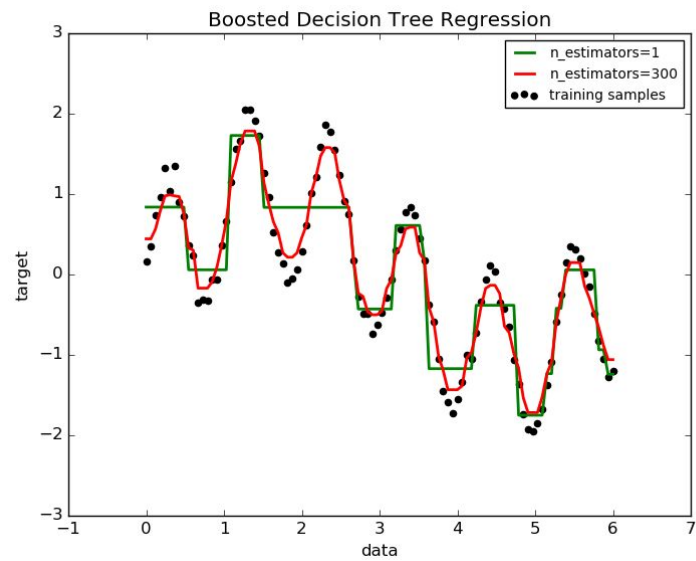
Result Prediction

Data Mining Models

Random Forest Classifier



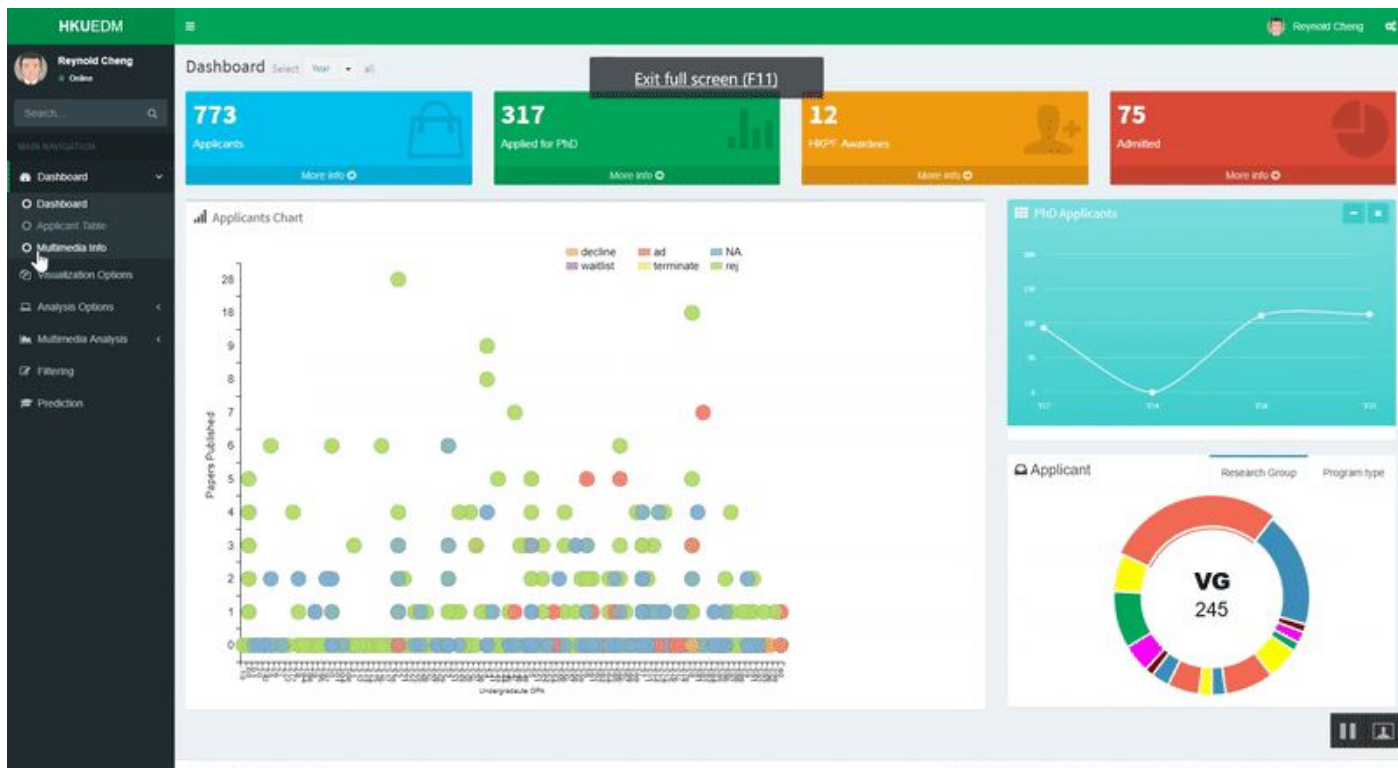
Random Forest Regressor



Conclusion

- What We Have Done & Result
 - Multimedia parameterization
 - Real-time predictions
 - System integration
 - Future Works
 - Video - additional sections
 - Text - other text material
-

Demonstration



Q & A

Receiver Operating Characteristic

