HKUCS Graduate Admission Data Analysis: A Multimedia Mining Approach

COMP4801

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Agenda

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- Methodology
  - Overall Structure
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  - Visual Data Extraction
- Information Analysis
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- Result Prediction
  - Data Mining Model
- Conclusion
- Demonstration
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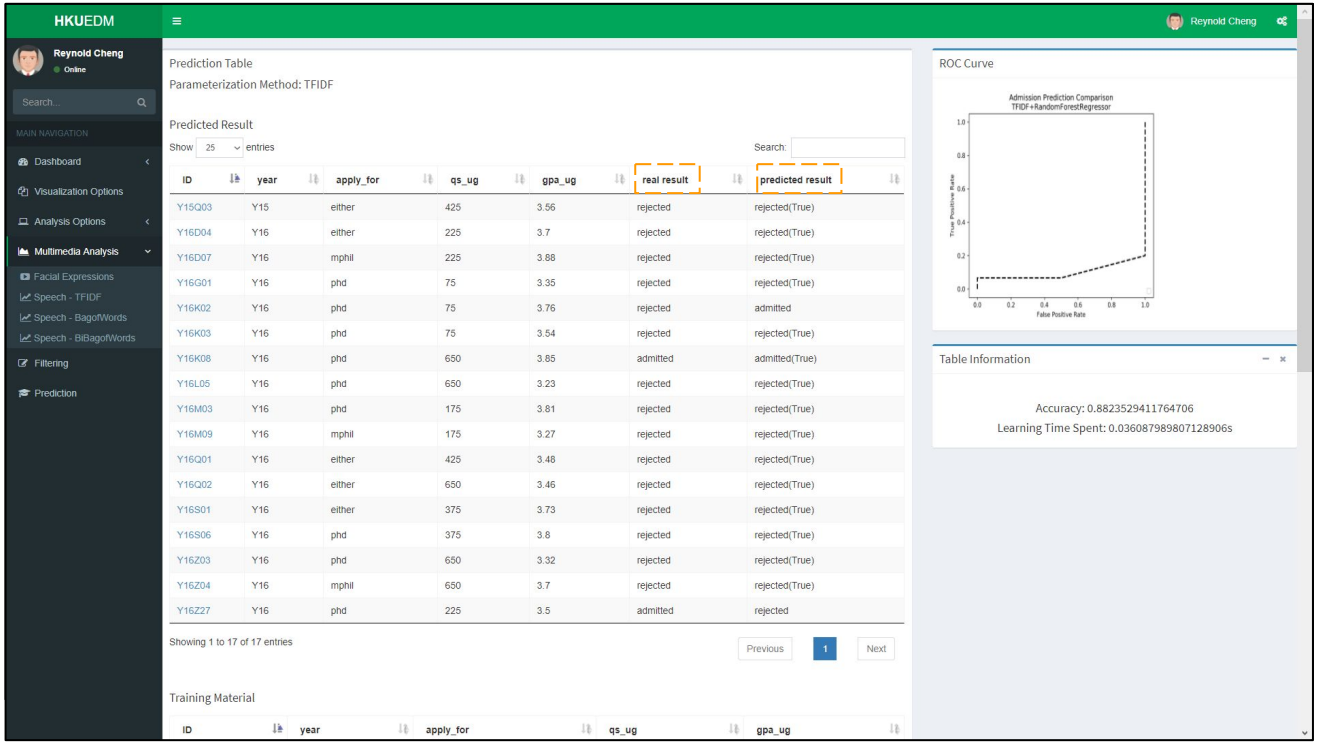
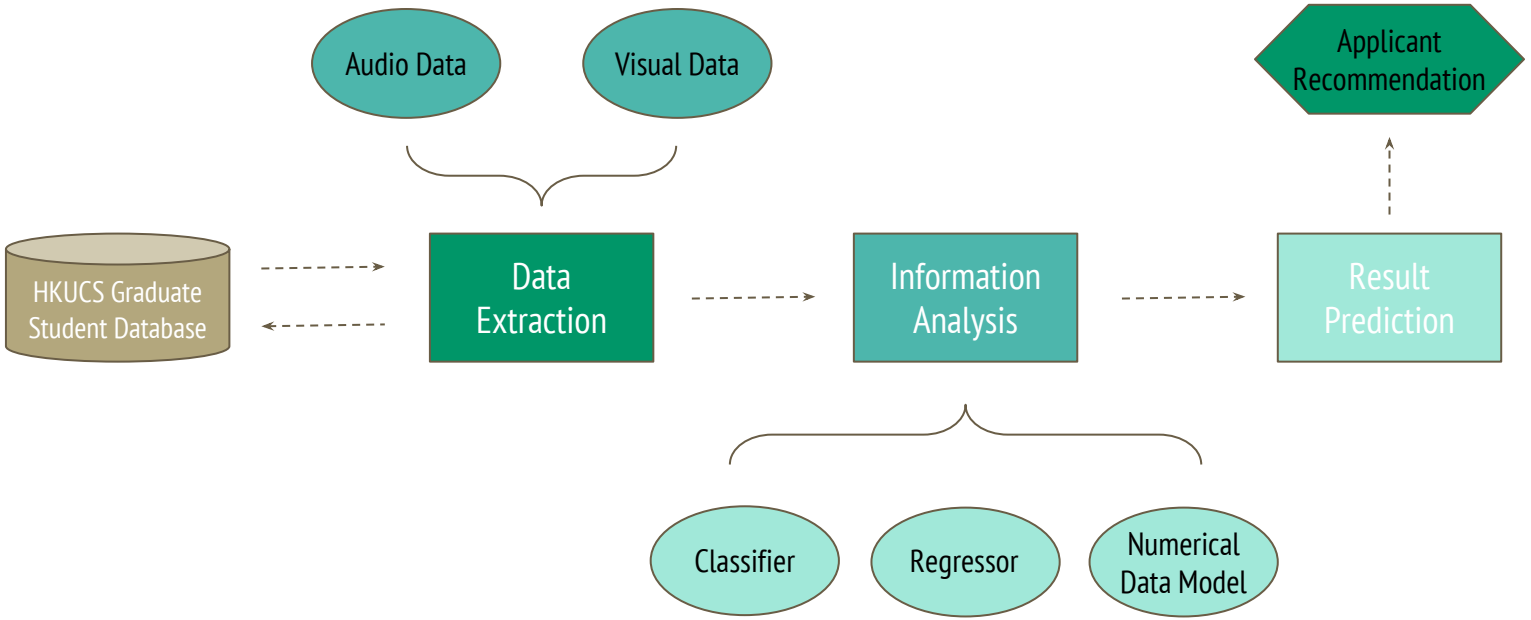
Introduction



Methodology

Overall Structure

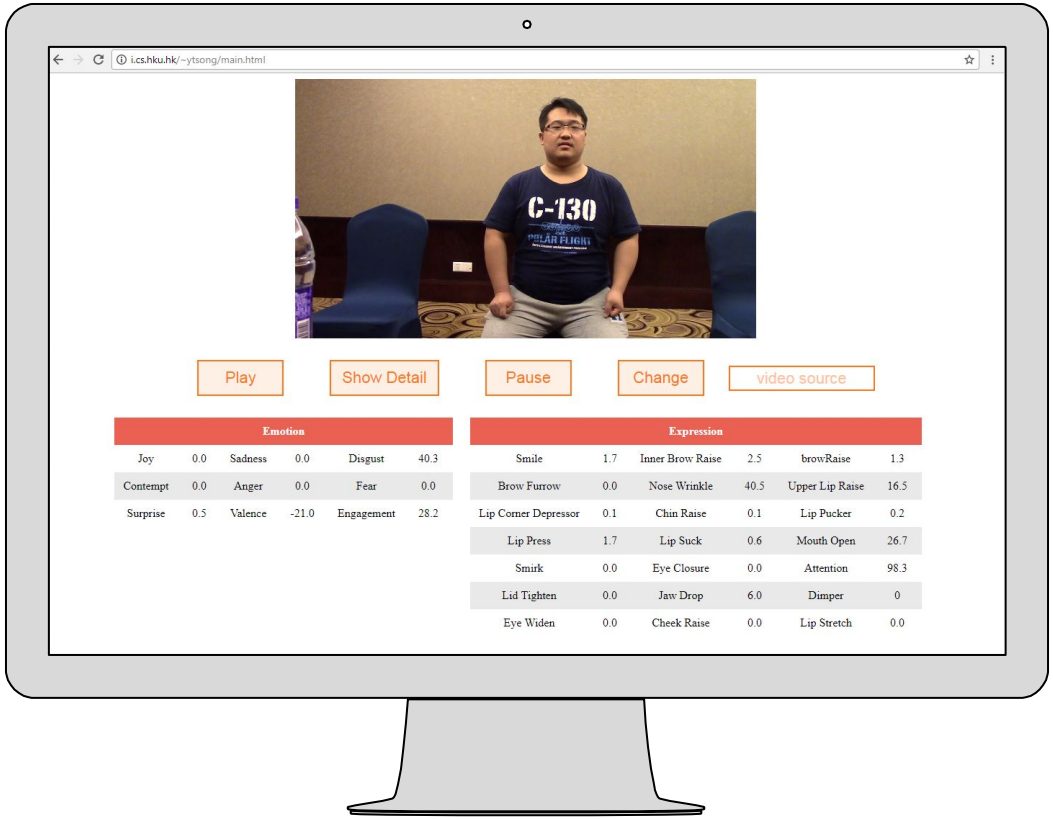


Audio Multimedia Data Extraction

- 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 electrica
 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
```

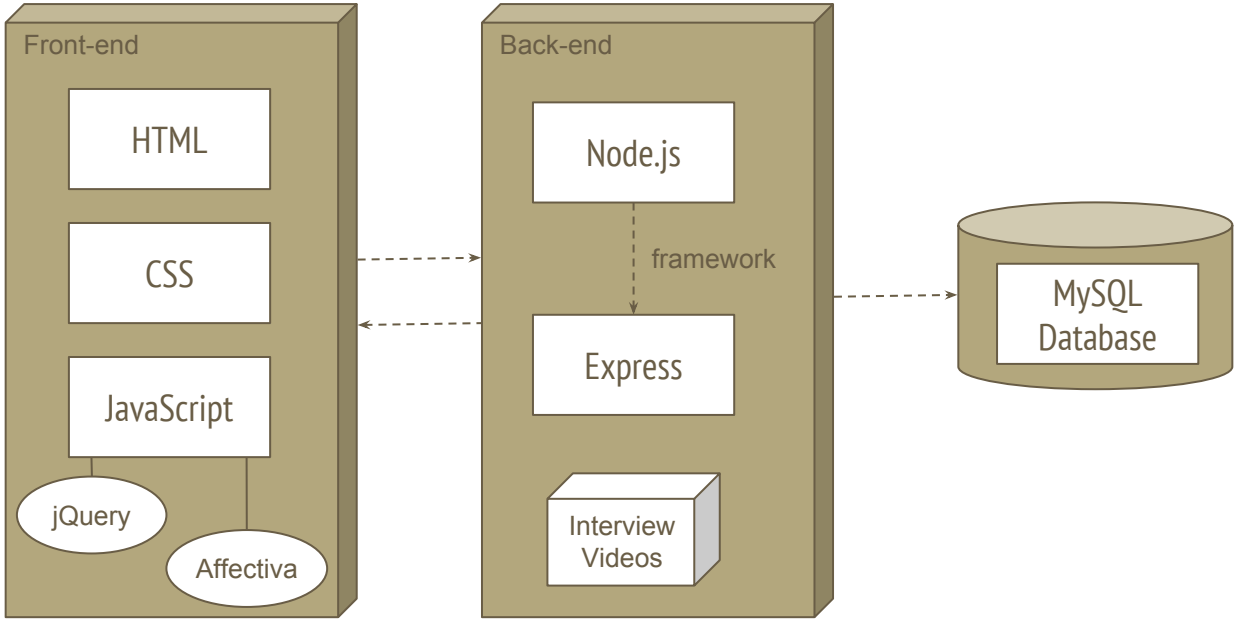
Visual Multimedia Data Extraction



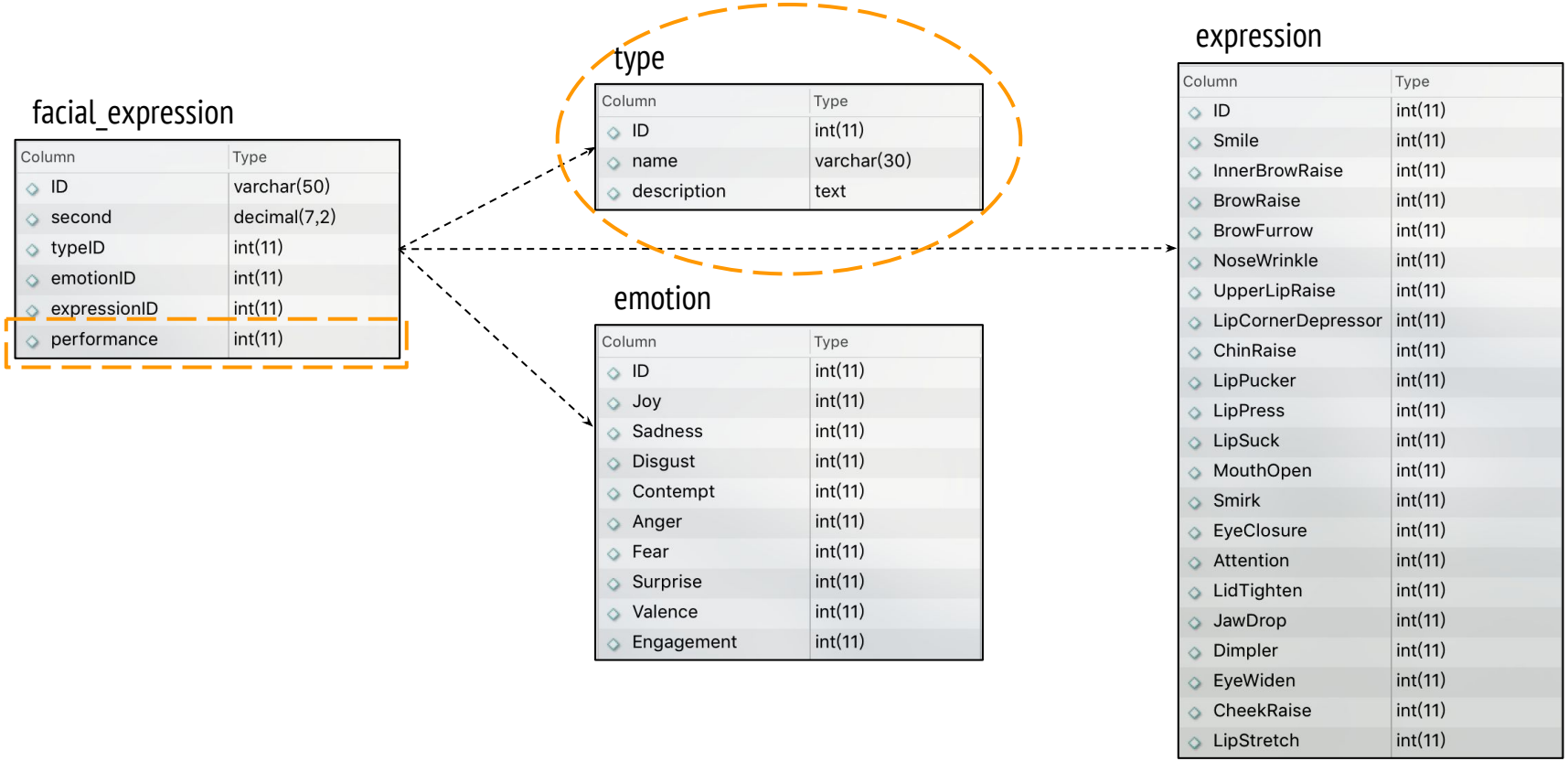
Emotion					
Joy	0.0	Sadness	0.0	Disgust	40.3
Contempt	0.0	Anger	0.0	Fear	0.0
Surprise	0.5	Valence	-21.0	Engagement	28.2

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



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

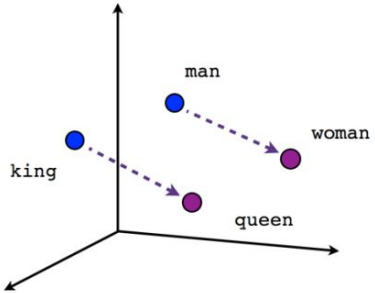
- Bag-of-words
- Bigram bag-of-words
- Tf-idf
- Word2Vec

	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

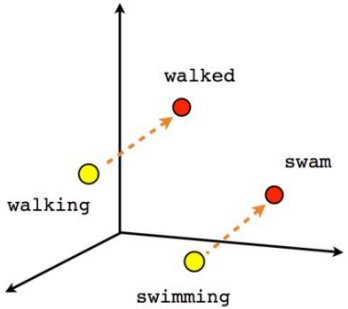
Numerical Data Model

- 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

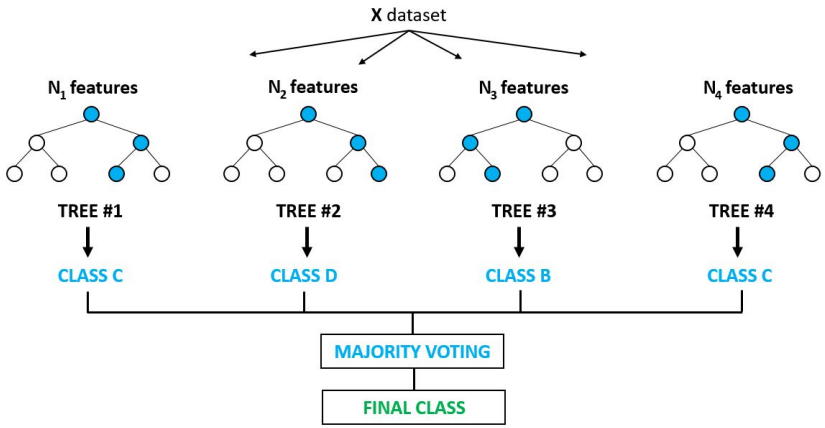


Verb tense

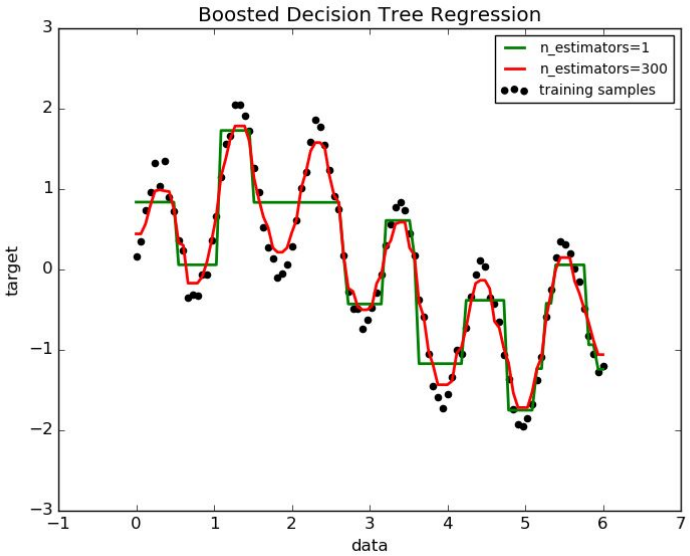
Result Prediction

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