Text Analysis for Higher Education

More than just word clouds!

Presented by: Mr. Kevin Chang, Founder and CEO

Dr. Isaiah Lankham,
University of California Office of the President

KAI ANALYTICS

California Association for Institutional Research | November 20, 2020

The COST of student attrition (US)

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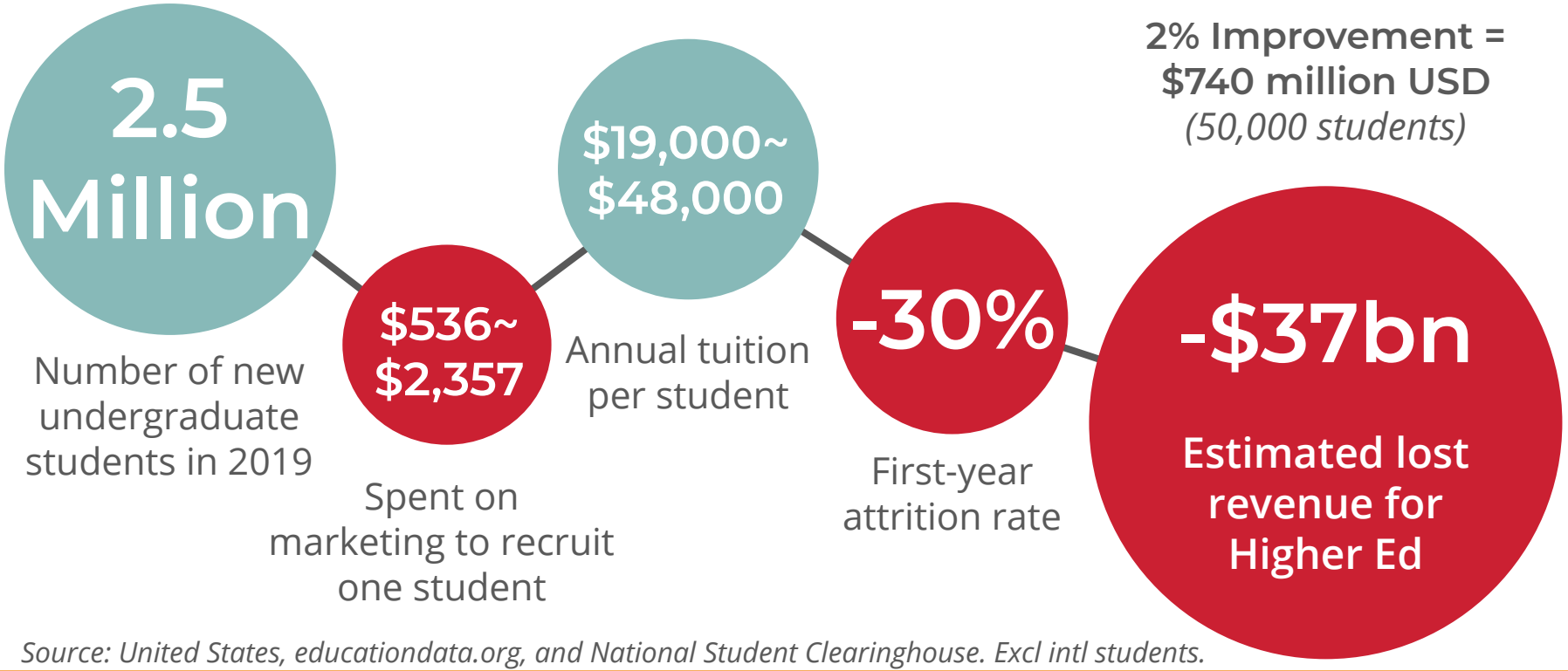

Source: United States, educationdata.org, and National Student Clearinghouse. Excl intl students.

Mitigate the risk of attrition

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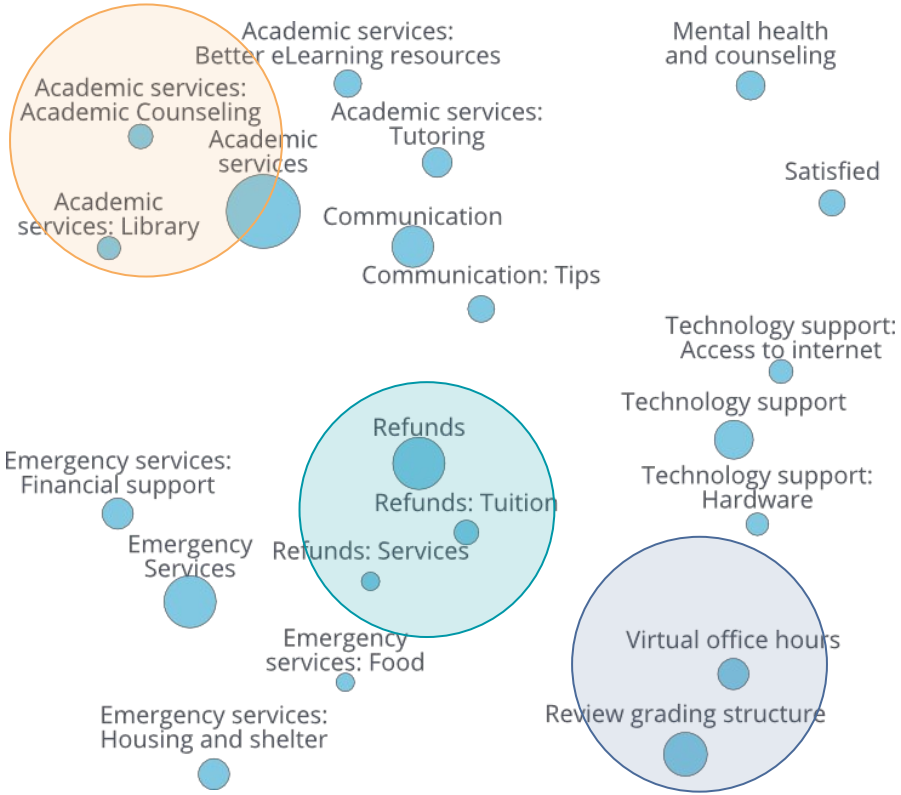
Transition Management during COVID-19

"I would appreciate if my school would either **give us our money back** for the time we lost or **allowed us to do a pass-fail option** for our transcripts. Otherwise, I wish they would **allow academic counseling online** to determine how we move forward."

- *First Year student, Texas*



Source: www.kaianalytics.com/studentsuccess

Mitigate the risk of attrition

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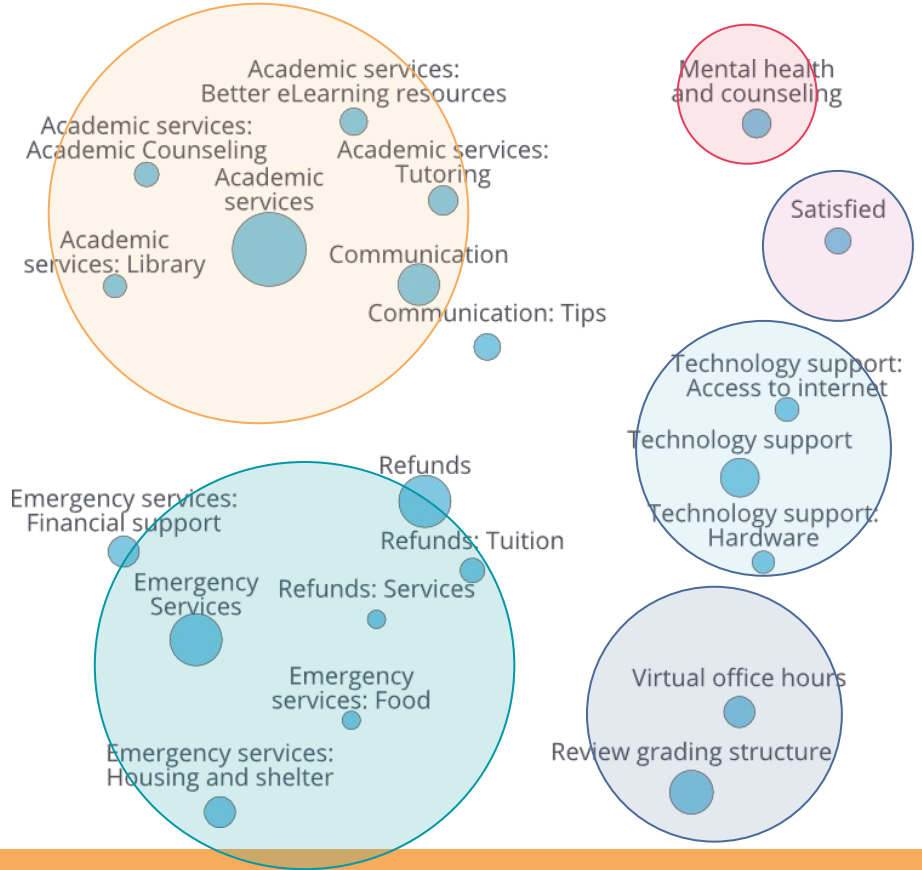
Transition Management during COVID-19

"I would appreciate if my school would either **give us our money back** for the time we lost or **allowed us to do a pass-fail option** for our transcripts. Otherwise, I wish they would **allow academic counseling online** to determine how we move forward."

- *First Year student, Texas*



Source: www.kaianalytics.com/studentsuccess

Save hundreds of manual reading

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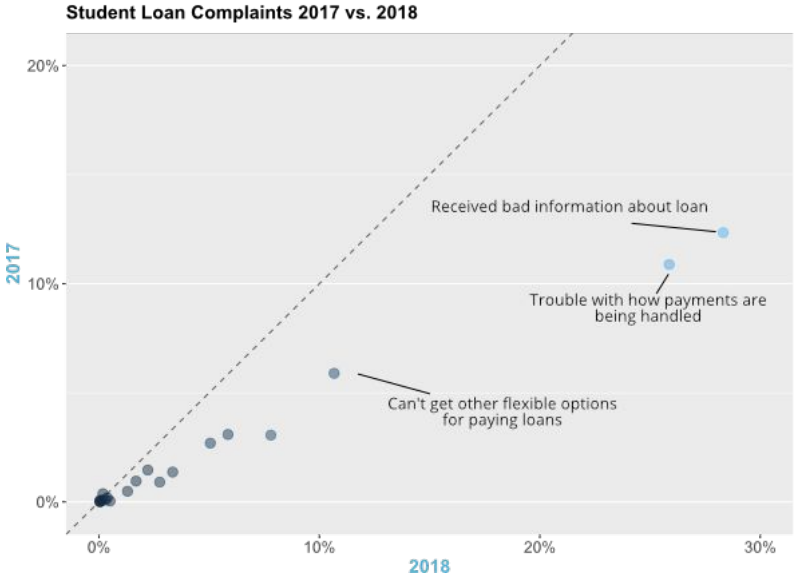
Date received	Product	Sub-product	Consumer complaint narrative
1/8/2019	Student loan	Federal student loan servicin	XXXX XXXX refuses to accurately calculate the number of qualifying payments I have made on my student loan
2/20/2019	Student loan	Private student loan	My original lender was XXXX XXXX XXXX ; this loan was considered a private loan that my parents took out to pay
3/5/2019	Student loan	Federal student loan servicin	I had to take out loans to attend college part time from XXXX.
1/19/2017	Student loan	Non-federal student loan	I had filed bankruptcy XX/XX/XXXX I was thinking I had gotten XXXX XXXX loan discharged due to XXXX issues. I h
1/14/2019	Student loan	Federal student loan servicin	PHEAA is harassing me claiming I have a loan with them. Over the last 12 months I've corresponding back and for
6/13/2019	Student loan	Private student loan	Last Year around XXXX, I received a letter from XXXX XXXX XXXX regarding a student loan- I sent a debt validation
2/25/2019	Student loan	Private student loan	In 2013 I consolidated ALL of my loans to make one bulk payment of {$12000.00} to National Credit Services to
5/19/2019	Student loan	Federal student loan servicin	In addition to my TEACH Grants being wrongfully converted to loans in XXXX of XXXX, my loans have now been
1/9/2019	Student loan	Private student loan	I took out my XXXX XXXX loan in order to go to college. I was told when I signed up that I would get the best custo
12/20/2018	Student loan	Private student loan	Navient has continuously harassed, lied and pushed me into forbearance. I had my student loans with them sinc
12/28/2018	Student loan	Federal student loan servicin	I applied for a loan consolidation with XXXX XXXX in XX/XX/XXXX because they already held a bulk of my graduat
6/20/2019	Student loan	Federal student loan servicin	I have been out of work for months now and Im not receiving any kind of income I just had a baby a few Months
2/23/2019	Student loan	Federal student loan servicin	I have three school loans taken out one that happens to be in XXXX (XXXX paid and XXXX balance) before I was e
4/4/2019	Student loan	Private student loan	This is regarding Navient. On XX/XX/19 I received my first phone call at XXXX, then again at XXXX, again at XXXX,
5/3/2019	Student loan	Federal student loan servicin	I've dealt with Navient XXXX XXXX XXXX many times starting from XX/XX/2019 to the current date (XX/XX/2019).
2/27/2019	Student loan	Federal student loan servicin	Case # XXXX was a prior issue that I had with XXXX. This Case was resolved because a review was completed of a
7/9/2019	Student loan	Federal student loan servicin	I have not received an accurate pay-off figure in writing for the debt I am being asked to pay. I have received a
2/25/2019	Student loan	Federal student loan servicin	I have been trying to reach Credit Adjustments Inc. by telephone for days. I dial the number and get a recording t
3/21/2019	Student loan	Private student loan	I co-signed on my husband 's student loan with XXXX, when he graduated the loan was transferred to Firstmark
6/24/2019	Student loan	Federal student loan servicin	I thought ALL of my student loans had been consolidated but one had not. I contacted Navient and was informed
7/11/2019	Student loan	Federal student loan servicin	I am applying for the XXXX time to have my student loans discharged since 2015 based on my total and XXXX XX
5/25/2019	Student loan	Private student loan	I paid off our student loan back on XX/XX/2019 in the amount of XXXX.
6/27/2019	Student loan	Private student loan	General revenue services has been harassing me since XXXX. Two to 5 phone calls per day Monday through
8/28/2019	Student loan	Private student loan	In XXXX, I received a bill for {$740.00} from Navient. On XX/XX/2019, I called and expressed my concerns for repa
7/17/2019	Student loan	Federal student loan servicin	I was not properly notified that my student loan repayments were to begin. I regularly monitor my credit score, a
7/9/2019	Student loan	Federal student loan servicin	Navient contacted my wife two weeks ago on her number leaving a message for me indicating I was 90 days past
7/13/2019	Student loan	Federal student loan servicin	I applied for and received federal student loans while I was in medical school. I made every payment on time
6/26/2019	Student loan	Private student loan	After recently requesting a " verification of debt " from Navient due to my account balances appearing to be
2/21/2019	Student loan	Federal student loan servicin	I object to the amount owed to the Department of Education. My original loan amount was {$53000.00}.
2/27/2019	Student loan	Federal student loan servicin	I have no idea what is happening to my student loans from XX/XX/2009. I originally had 2 loans when graduating
2/25/2019	Student loan	Private student loan	I was placed into a (Navient) payment plan I believe during XX/XX/XXXX and payments were made of {$130.00}



Turning 1.5 million complaints into actionable insights

Source: US Consumer Financial Protection Bureau (CFPB)

Improve student satisfaction

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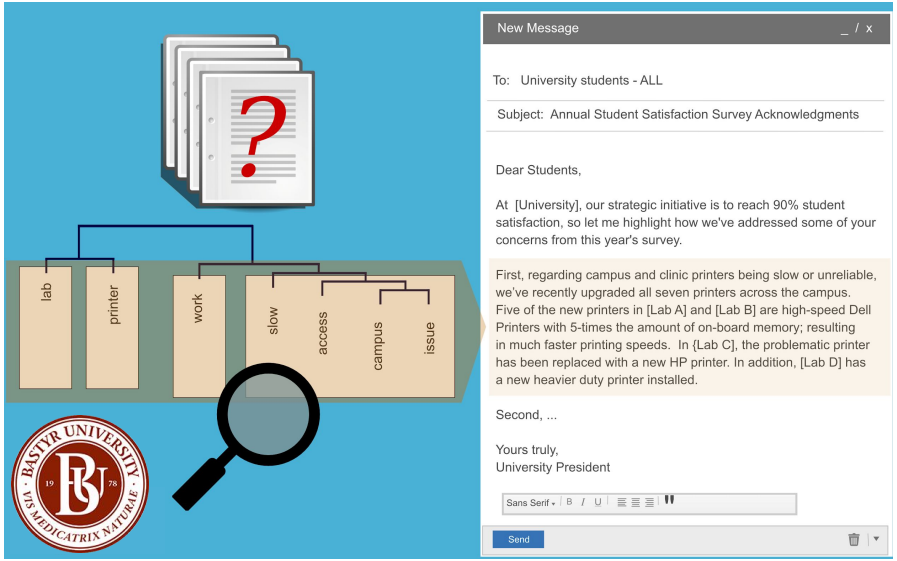
Improved response rates to **59%**

Improved approval rates to **91%**

Overall attrition improved from:
8% to 4%



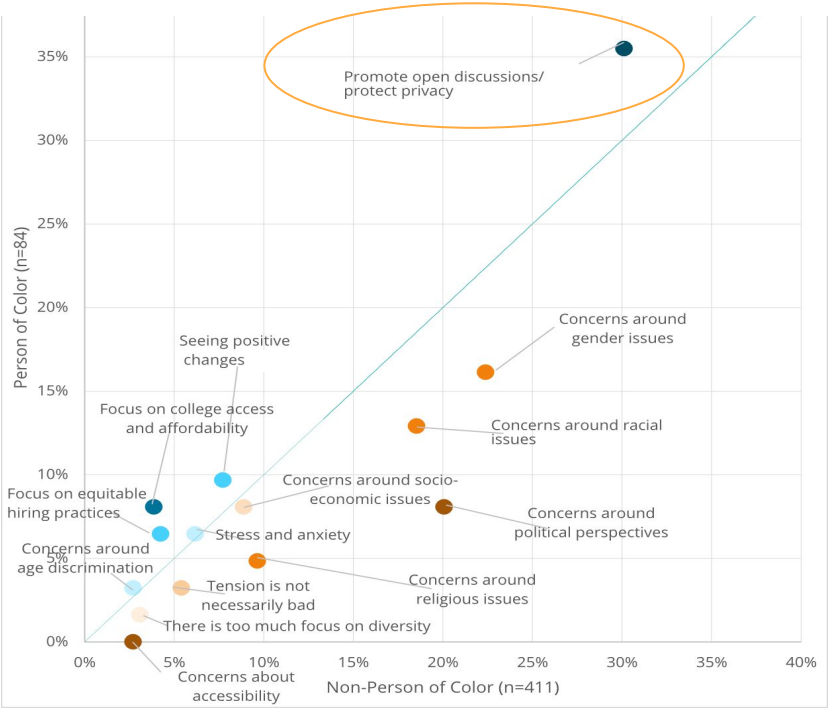
AN ESTIMATED $259,000 OF REVENUE SAVED FROM A 4% IMPROVEMENT IN RETENTION.

Source: Bastyr University Fast Facts: 2014-15 and 2015-16 Reporting Period. Annual tuition $37,000 USD

A Positive Campus Climate

"Our next three-year plan will focus on promoting open discussion and protecting privacy"

- *Associate Provost*



What we do at Kai Analytics

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Survey Gurus

qualtrics

surveygizmo

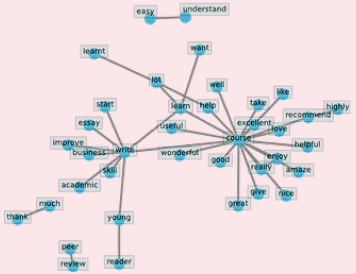
Typeform

SurveyMonkey

explorance.

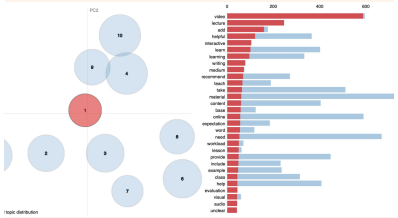
Building Integrations

Thematic Extraction



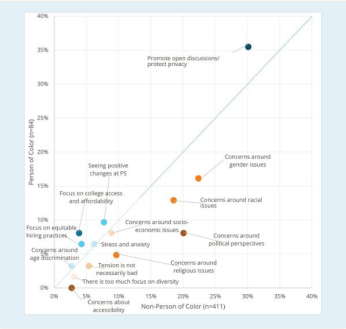
More than just a word cloud

Topic Modeling



Effectively cluster ideas together

Segmentation



Identify important differences

The NLP Pipeline

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Survey Data

Data Preprocessing

-

Tokenize + Remove: Stop Words, Lemmas, Part of Speech

N-grams

Themes Visualization

Today's Goals:

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1. Identify key concepts from NLP and linguistics and how they are used to analyze language.
2. Apply general NLP functions using the Natural Language Toolkit (NLTK) package in Python.
3. Visualize and interpret the results.
4. Recognize some of NLTK's limitations.

Try it in Google CoLabs

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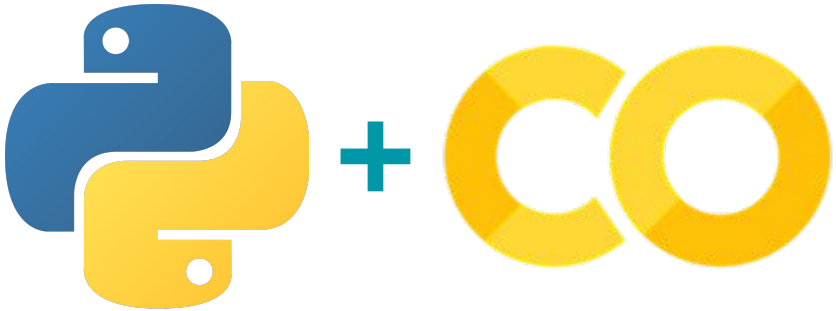
bit.ly/kaianalytics_code



Google Colabortory is a web-based interactive programming tool (*Jupyter Notebook*).
It is great for learning and testing, supports many data science modules, and is free*!

The Dataset

	A	B	C
1	CourseId	Comment	Label
2	academic-writing-capstone	I am very excited that I have been able to successfully complet	5
3	academic-writing-capstone	I like all these courses	5
4	academic-writing-capstone	The research needs like six months	4
5	academic-writing-capstone	It was an excellent challenge that tested all my previous skill ac	5
6	academic-writing-capstone	The course content is great, but peer evaluation is simply usele	2
7	academic-writing-capstone	Excellent!	5
8	academic-writing-capstone	Writing research paper is one of the most useful courses for al	5
9	academic-writing-capstone	I have learned so very much. All of the courses in the specializa	5
10	academic-writing-capstone	I would love to thank you for your hard working. It was a gooc	5
11	academic-writing-capstone	It is a great moment in my academic experience. Thank you Pro	5
12	academic-writing-capstone	Excellent course! I'm grateful to all who made it possible.	5
13	advanced-writing	I'm so happy to make it! I learnt so much about academic writi	5
14	advanced-writing	I have learnt alot from this course	5
15	advanced-writing	Very good course for writing in a systematic way.	5
16	advanced-writing	Excellent course for whom really wants to boost his/her writin	5
17	advanced-writing	æŠŠå-¦æœ¯å‰½çªƒä¸“é—¨æ‹Žå‡ºæ¥è®²ä¹Ÿæ˜¯éžå¸¸è‰¯å¿ƒ	3
18	advanced-writing	Enjoyed this course very much. Thank you.	5
19	advanced-writing	This is not an easy course, but once you finish it, your academi	5
20	advanced-writing	perfect course to get perfection in writing	5
21	advanced-writing	It says 'advanced writing' but it is advanced for college student	1
22	advanced-writing	Very Helpful	5
23	advanced-writing	Excellent	5
24	advanced-writing	Great Course I like it a lot. I learn new things for my research	5
25	advanced-writing	You need to check out his course.	4
26	advanced-writing	I learned how to write different types of essays.	5
27	advanced-writing	Pretty good!	5
28	advanced-writing	è€å¸ˆè®²å¾—å¾ˆç»†è‡´ï¼Œå¾ˆå—ç”¨ï¼Œåˆšå¥½å‡‘ä¸Šæˆ‘è€	5
29	advanced-writing	gOOD COURSE	5

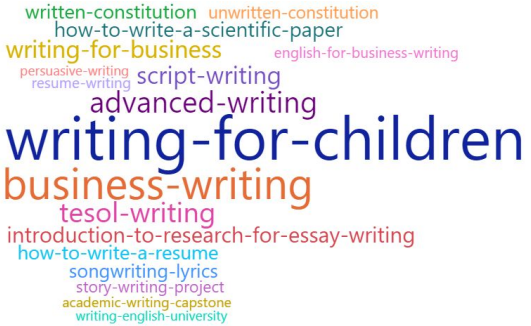
comments

1,297 (140,000+ total)

Course reviews from Coursera.
English & writing-related courses

(Source: Kaggle)

19 Unique Courses



Data Preprocessing

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> Writing a Research Paper is one of the most useful courses for all professionals.

Tokenization (Bag of words)

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> Writing a Research Paper is one of the most useful courses for all professionals.

Stop Words

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"Writing a Research Paper is one of the most useful courses for all professionals.

Writing research paper one useful courses professionals

Lemmatization

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FORM	STEM	LEMMA
studies	studi	study
studying	study	study

Retrieving the **dictionary form** of a words so they can be **analyzed as a single item.**

Tagging for Parts of Speech

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CC	Coordinating conjunction	NNS	Noun, plural	UH	Interjection
CD	Cardinal number	NNP	Proper noun, singular	VB	Verb, base form
DT	Determiner	NNPS	Proper noun, plural	VBD	Verb, past tense
EX	Existential there	PDT	Predeterminer	VBG	Verb, gerund or present participle
FW	Foreign word	POS	Possessive ending	VBN	Verb, past participle
IN	Preposition or subordinating conjunction	PRP	Personal pronoun	VBP	Verb, non-3rd person singular present
JJ	Adjective	PRP$	Possessive pronoun	present	Verb, 3rd person singular present
JJR	Adjective, comparative	RB	Adverb	WDT	Wh-determiner
JJS	Adjective, superlative	RBR	Adverb, comparative	WP	Wh-pronoun
LS	List item marker	RBS	Adverb, superlative	WP$	Possessive wh-pronoun
MD	Modal	RP	Particle	WRB	Wh-adverb
NN	Noun, singular or mass	SYM	Symbol		
		TO	to		

N-Grams

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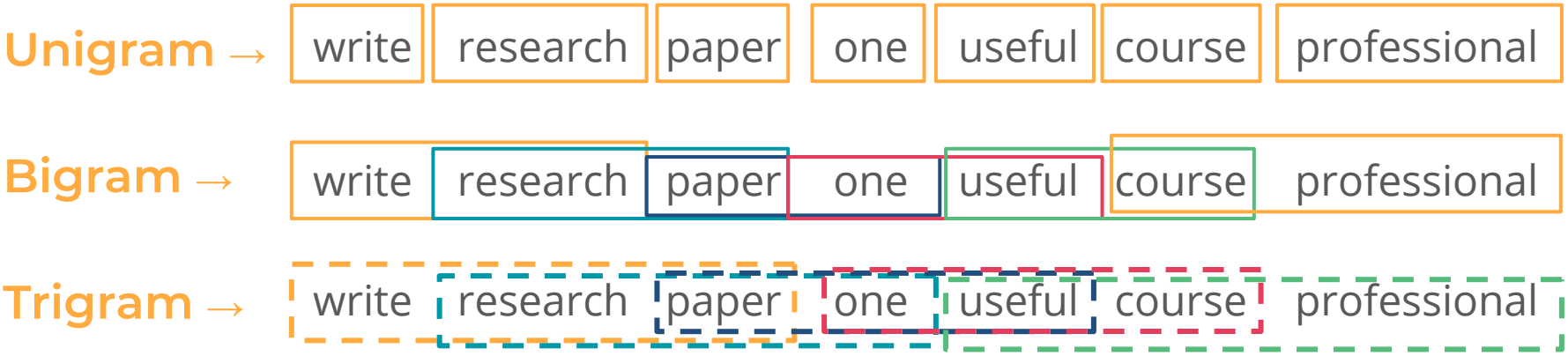
Writing a Research Paper is one of the most useful courses for all professionals.



Thematic Visualization

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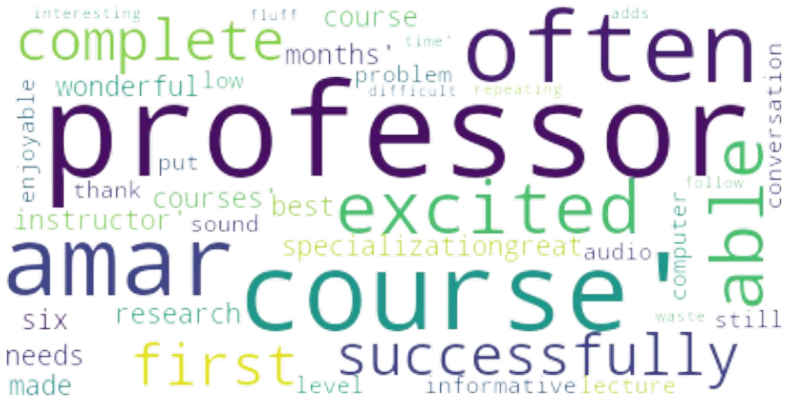

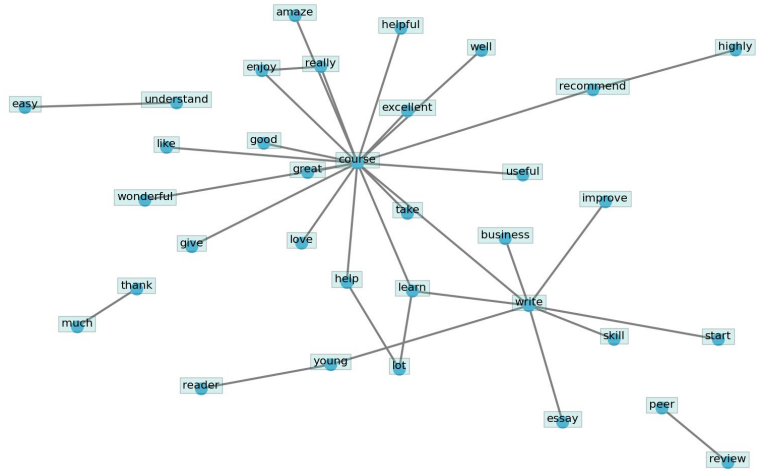

Graphs are mathematical structures used to study pairwise relationships between objects and entities. This makes them ideal for visualizing bi-grams

Recommendations

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1. Do keep open-ended questions are succinct.
2. Do run a spell checker early in your pipeline.
3. Do build custom dictionaries for institutional lingo, acronyms, terminology, etc.
4. The biggest category/theme might be least interesting.
5. Be aware of bias.

Be Aware of Bias in Text Analysis

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https://towardsdatascience.com/gender-bias-word-embeddings-76d9806a0e17

Additional Topics

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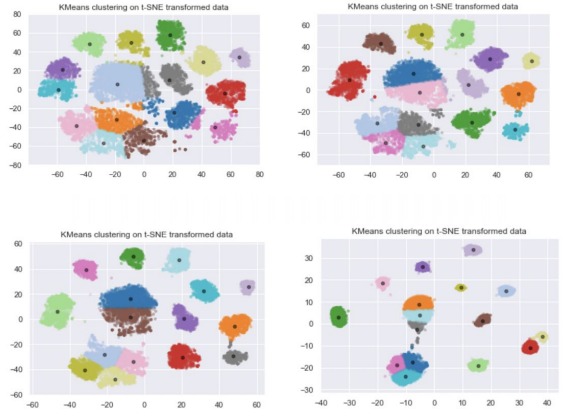
Sentiment Analysis



Topic Modeling

In NLP, things can move quickly from a simple positive ←→ negative scale to a much more complex unsupervised topic modeling.

Additional Resources

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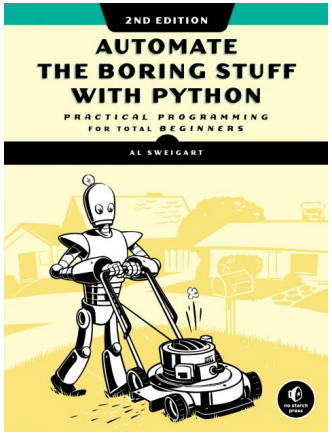
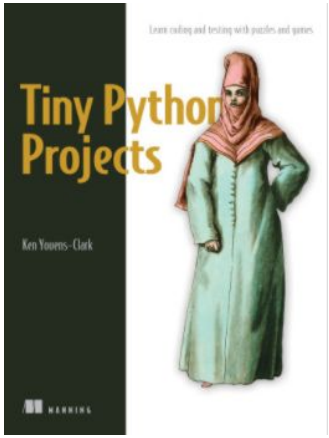


Beginner: Projected-focused. From web scraping to processing PDFs, etc.
https://nostarch.com/automatestuff2



Intermediate:
https://www.manning.com/books/tiny-python-projects

Additional Resources

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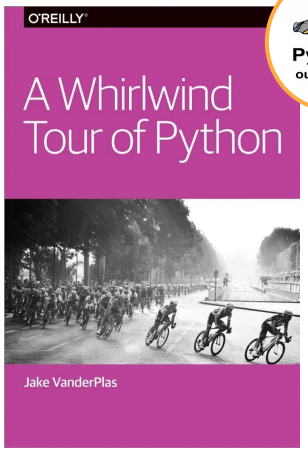
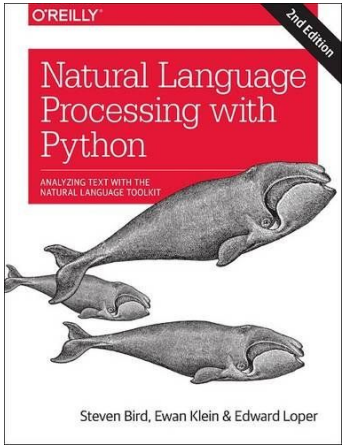


Python out LOUD

Recommended by my podcast co-hos @pythonoutloud

Fasted-paced intro to essential features of python for folks with some coding experience https://jakevdp.github.io/WhirlwindTourOfPython/



The first edition is free at: https://www.nltk.org/book/

Acknowledgements

KAI ANALYTICS

Kevin

Founder and CEO
10 yrs in Higher Ed
2X Startup Exp

Tal

Senior Developer
20 yrs full-stack programming

Adriana

Design Specialist
Emily Carr University

Core Team

Toshiko

R&D Scientist
Computational Linguistics @UBC

Sharon

MBA Student
Georgetown University

Interns

Acknowledgements

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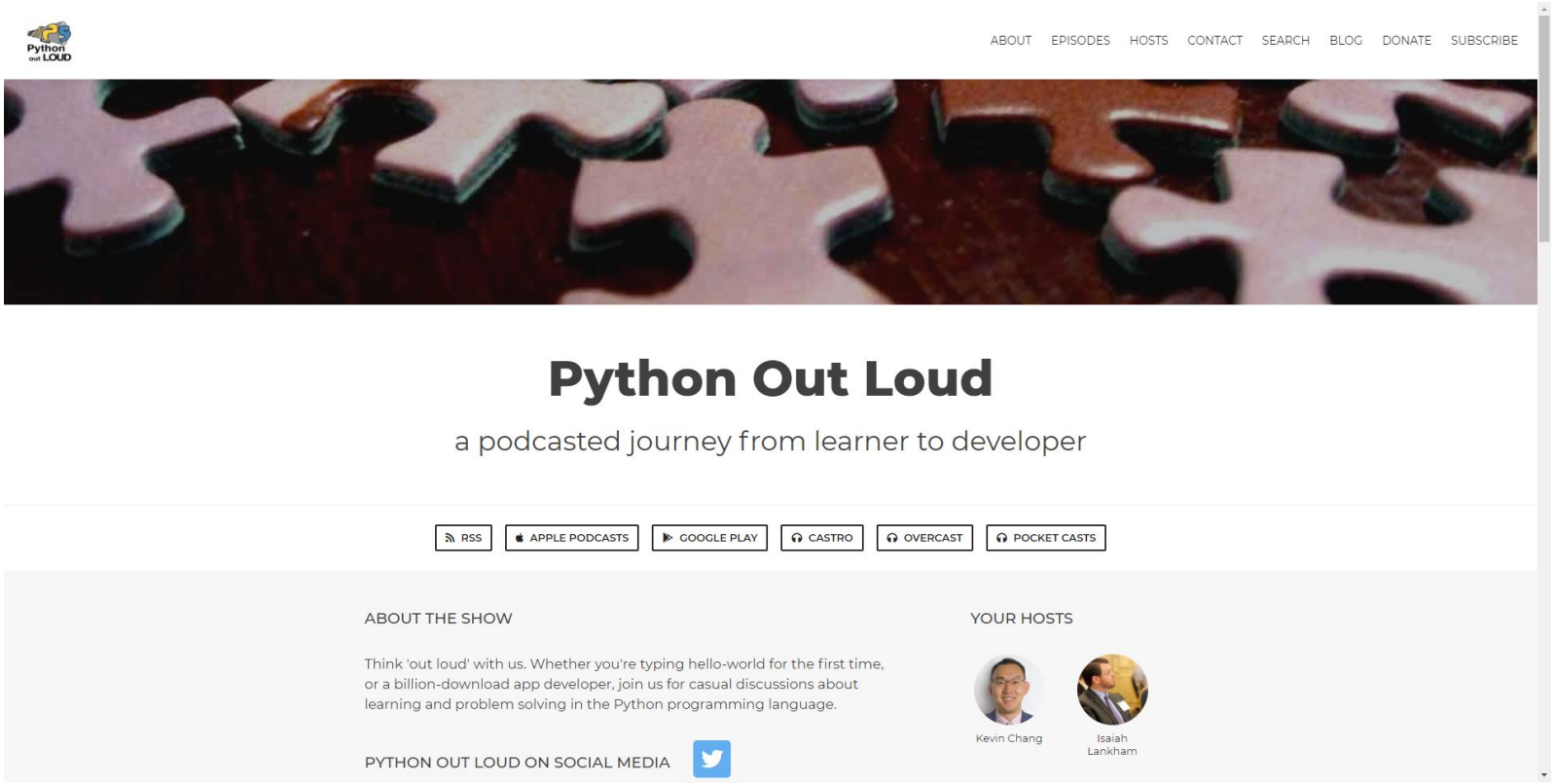

In Beta - Seeking Early Adopters

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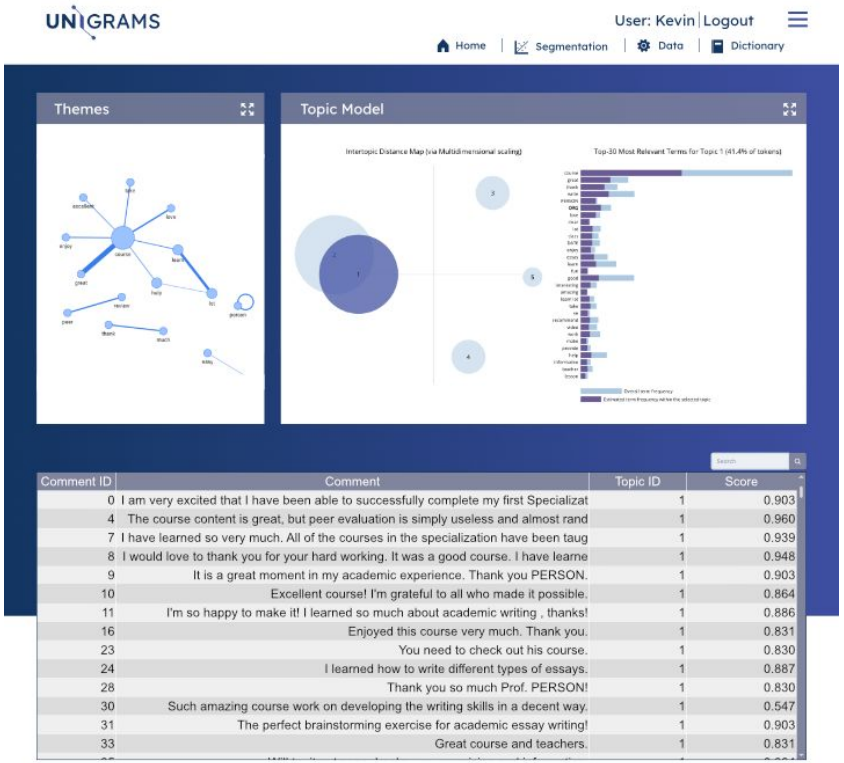

Comment ID	Comment	Topic ID	Score
0	I am very excited that I have been able to successfully complete my first Specializat	1	0.903
4	The course content is great, but peer evaluation is simply useless and almost rand	1	0.960
7	I have learned so very much. All of the courses in the specialization have been taug	1	0.939
8	I would love to thank you for your hard working. It was a good course. I have learne	1	0.948
9	It is a great moment in my academic experience. Thank you PERSON.	1	0.903
10	Excellent course! I'm grateful to all who made it possible.	1	0.864
11	I'm so happy to make it! I learned so much about academic writing , thanks!	1	0.886
16	Enjoyed this course very much. Thank you.	1	0.831
23	You need to check out his course.	1	0.830
24	I learned how to write different types of essays.	1	0.887
28	Thank you so much Prof. PERSON!	1	0.830
30	Such amazing course work on developing the writing skills in a decent way.	1	0.547
31	The perfect brainstorming exercise for academic essay writing!	1	0.903
33	Great course and teachers.	1	0.831

- Secure and Encrypted Data Hosted within the US
- Save hours spent manually reading comments
- Protect anonymity. Hide names, numbers, dates and more
- Advanced NLP technology designed for HigherEd

www.unigrams.com

Thank You

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Founder and CEO

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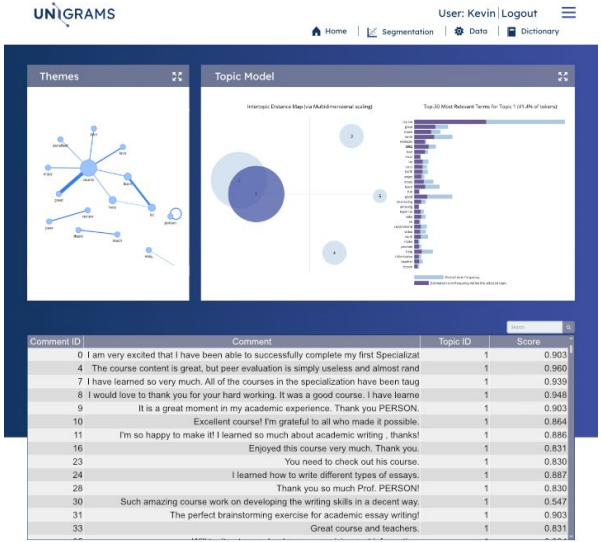

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