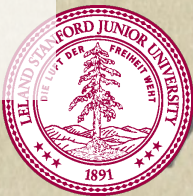




Ethics of Data Analysis:  
Choices, Values, and Burritos

Piech + Sahami, CS106A, Stanford University



# Assignment 6: Sneak Preview



# Learning Goals

1. Explore how Choices Embed Values
2. Define "Bias" & "Fairness"
3. Distinguish Normative from Descriptive
4. Problem Formulation, Representation & Long Tail



# Assignment 5: Ratings

QUALITY

5.0

106A



AWESOME

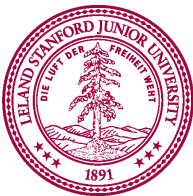
Feb 10th, 2015

For Credit: **Yes** Textbook: **Yes**

Mehran Sahami, what Stanford is all about, great teaching, new ideas, helping you ask big questions and build awesome stuff.

DIFFICULTY

4.0



# Assignment 5: Ratings

QUALITY

5.0

DIFFICULTY

4.0

106A

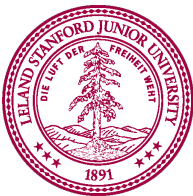


AWESOME

Feb 10th, 2015

For Credit: Yes Textbook: Yes

Mehran Sahami, what Stanford is all about, great teaching, new ideas, helping you ask big questions and build awesome stuff.



# Are These Ratings Biased?

QUALITY

5.0

DIFFICULTY

4.0

106A

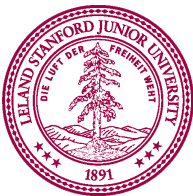


AWESOME

Feb 10th, 2015

For Credit: Yes Textbook: Yes

Mehran Sahami, what Stanford is all about, great teaching, new ideas, helping you ask big questions and build awesome stuff.



# What is in the Dataset?



# You Have The Power to Find Out:



CS Skills



# You Have The Power to Find Out:



Ethics Skills

CS Skills

# You Have The Power to Find Out!

Values &  
Habits

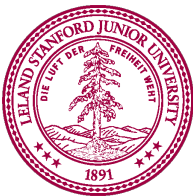
Ethics Skills

CS Skills



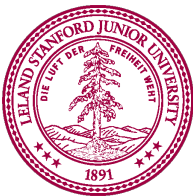
# What is Bias?

**Bias: difference between measured results and "true" value**



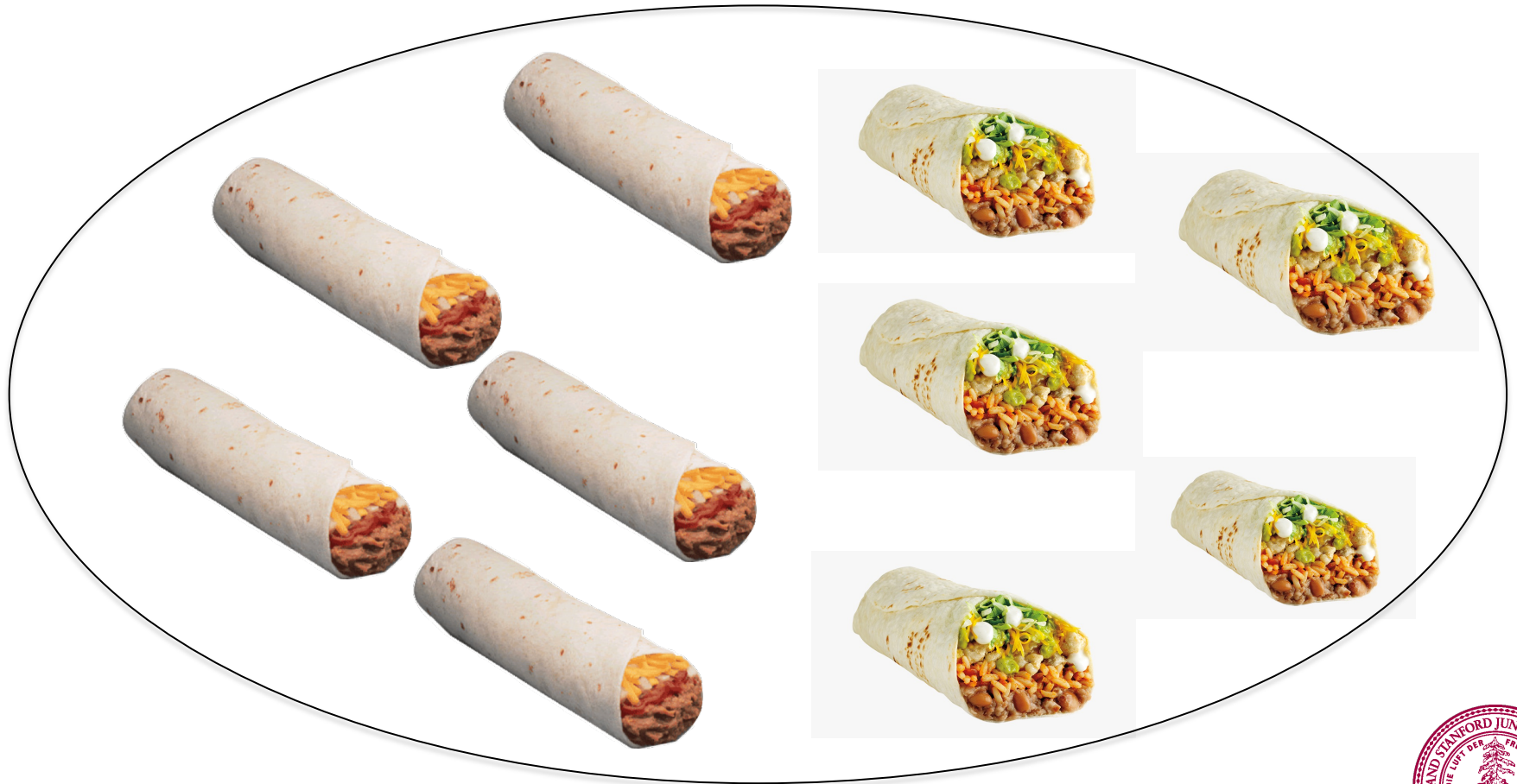
# What is Bias?

**Bias: difference between measurement results and "true" value**



# What is Bias?

**Bias: difference between measurement results and "true" value**



# What is Bias?

**Bias: difference between measurement results and "true" value**



**"Sampling Bias"**

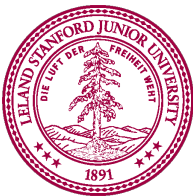
**Statistical Bias: learn more in future computer science & statistics classes!**



# What is Bias?

**Bias: difference between measurement results and "true" value**

**What kinds of bias raise ethical concerns?**

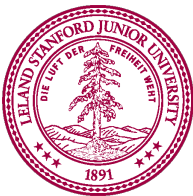


# Discriminatory Bias

Biased measurement or classification

+ use of that bias to compound existing injustice or fail to treat all as having equal moral worth

=> Unfair Bias





# Unfair Bias in Ratings

How might this definition of work  
in ratings?



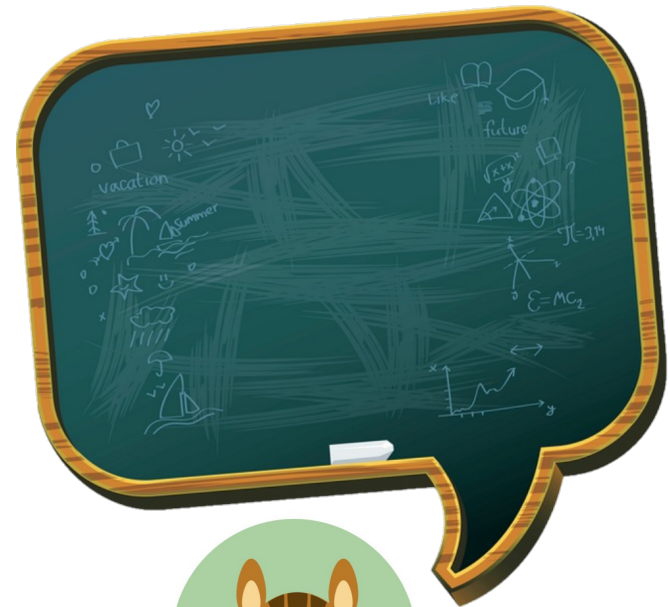
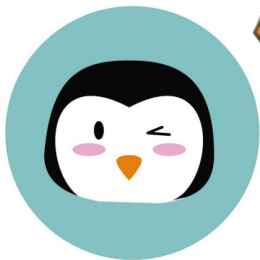
# Equality of Opportunity?

Equality of Opportunity: everyone has same opportunity to develop skills needed for the job, apply for the job, and get promoted.



# Parity: Equality of Numbers

Parity: Everyone is equally likely to be a good teacher, so we should expect to end up with number of good teachers equal to population. Parity-fair ratings should reflect this.



# Measures of Fairness

## Simulating loan decisions for different groups

Drag the black threshold bars left or right to change the cut-offs for loans.  
Click on different preset loan strategies.

### Loan Strategy

Maximize profit with:

**MAX PROFIT**

No constraints

**GROUP UNAWARE**

Blue and orange thresholds are the same

**DEMOGRAPHIC PARITY**

Same fractions blue / orange loans

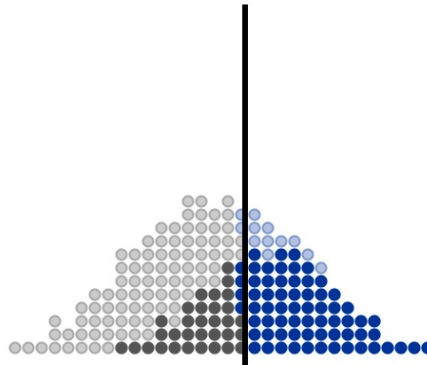
**EQUAL OPPORTUNITY**

Same fractions blue / orange loans to people who can pay them off

### Blue Population

0 10 20 30 40 50 60 70 80 90 100

loan threshold: 59

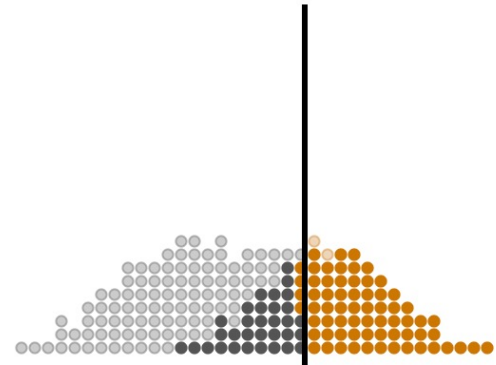


denied loan / would default (grey) granted loan / defaults (light blue)  
denied loan / would pay back (black) granted loan / pays back (blue)

### Orange Population

0 10 20 30 40 50 60 70 80 90 100

loan threshold: 53



denied loan / would default (grey) granted loan / defaults (light orange)  
denied loan / would pay back (black) granted loan / pays back (orange)



# Fairness: Beyond the Numbers

QUALITY

5.0

DIFFICULTY

3.0

**CS106A**



**AWESOME**

Mar 25th, 2017

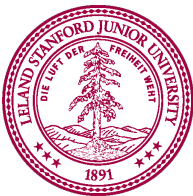
For Credit: **Yes** Attendance: **Mandatory** Would Take Again: **Yes** Grade: **A** Textbook: **Yes**

Chris Piech is everything! A natural teacher who loves his material and gets students to love it too. I want to be all that, do what he does, live that amazing life of being a great teacher at the world's greatest CS department.

RESPECTED

INSPIRATIONAL

AMAZING LECTURES



# Evaluation Beyond the Numbers

**NATURAL  
TEACHER**

QUALITY

**5.0**

**CS106A**

**AVG GRADE**

Mar 25th, 2017

For Credit: **Yes** Attendance: **Mandatory** Would Take Again: **Yes** Grade: **A** Textbook: **Yes**

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DIFFICULTY

**3.0**

**RESPECTFUL**

**INSPIRATIONAL**

**AMAZING LECTURES**

**GREAT**

**EVERYTHING!**



# Descriptive vs. Normative

## Descriptive language

- is
- was
- what people did
- what happened

## Normative language

- right
- wrong
- good
- bad
- should
- should not



# Descriptive or Normative?

**NATURAL  
TEACHER**

QUALITY

**5.0**

**CS106A**

 **AVG GRADE**

Mar 25th, 2017

For Credit: **Yes** Attendance: **Mandatory** Would Take Again: **Yes** Grade: **A** Textbook: **Yes**

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DIFFICULTY

**3.0**

**RESPECTED**

**INSPIRATIONAL**

**AMAZING LECTURES**







**Descriptive**



**Normative**

# Thick Normative Terms

“Thick” normative terms are both descriptive AND normative:

- brave : foolhardy



# Thick Normative Terms

“Thick” normative terms are both descriptive AND normative:

- brave : foolhardy
- Cowardly :



# Thick Normative Terms

“Thick” normative terms are both descriptive AND normative:

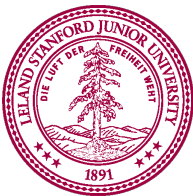
- brave : foolhardy
- Cowardly : cautious
- Polite : (?)
- rude : (?)
- chill
- kind
- etc



# Thick Normative Terms

## Thick Normative Terms & Fairness

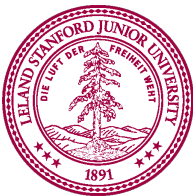
- We compare people in many ways, not just numerically
- Thick normative terms express “loaded” judgments



# Are These Claims Descriptive or Normative?

Mark Zuckerberg on whether Facebook would fact-check false claims about election suppression:

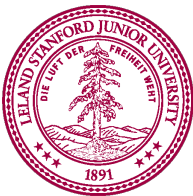
1. *"We have a different policy, I think, than Twitter on this."*
2. *"You know, I just believe strongly that Facebook shouldn't be the arbiter of truth of everything that people say online."*
3. *"I think in general private companies probably shouldn't be—or, especially these platform companies—shouldn't be in the position of doing that."*



# Are These Claims Descriptive or Normative?

Not surprising that statements setting the policy for platforms would be normative. What about the programs behind the platforms themselves?

*Do programs like the ones you are writing contain normative claims or values?*



How are values  
embedded in design?



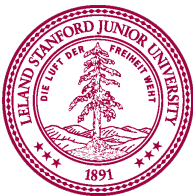
# 1. Problem Formulation Embeds Values

## 1. “Sandcastle” (warm-up) problem: Finding forest fires.

We’re going to start by writing a function called `highlight_fires` (in the file `forestfire.py`) that highlights the areas where a forest fire is active. You’re given a satellite image of Greenland’s 2017 fires (photo credit: Stef Lhermitte, Delft University of Technology). Your job is to detect all of the “sufficiently red” pixels in the image, which are indicative of where fires are burning in the image. As we did in class with the “redscreening” example, we consider a pixel “sufficiently red” if its red value is greater than or equal to the average of the pixel’s three RGB values times some intensity threshold. In this case, we have provided you with an appropriate intensity threshold of 1.05 via a constant named `INTENSITY_THRESHOLD` in the file `forestfire.py`. Note that this is a different intensity threshold value than we used in class for the “redscreening” example, as different applications often require different intensity threshold.

When you detect a “sufficiently red” pixel in the original image, you set its red value to 255 and its green and blue values to 0. This will highlight the pixel by making it entirely

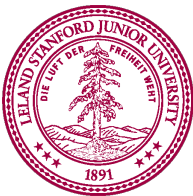
Formulating a problem means  
describing the **desired solution as**  
**good or worthy of being done.**



# Problem formulation and goal statements are normative

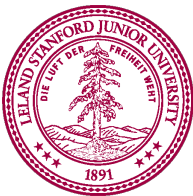
Formulating a problem means describing the **desired solution as good** or worthy of being done.

- What is the **problem to be solved**?
- **For whom is this a problem**? Who would benefit from its solution?
- **Who can agree** that this is a problem worth solving?



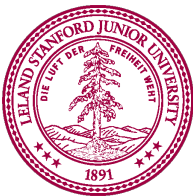
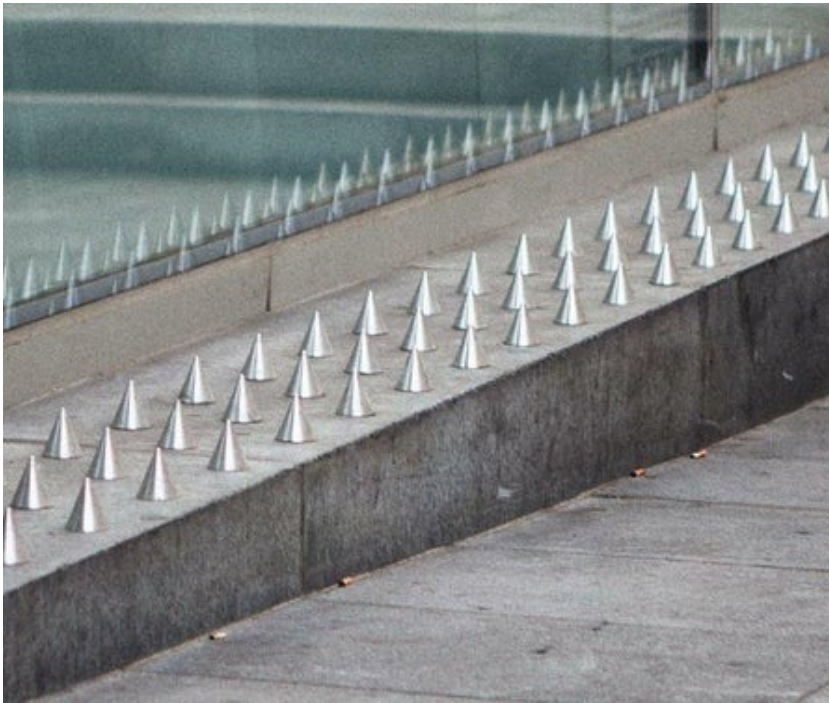
# What is the problem to be solved?

**“Homeless people are sleeping here and we (who is we?) want them to stop”**



# What is the problem to be solved?

“Homeless people are sleeping here and we (who is we?) want them to stop”



# What is the problem to be solved?

“Homeless people are sleeping here and we (who is we?) want them to stop”

“Some people in our community don’t have a place to sleep and we (who is we?) think they should”



# What is the problem to be solved?

“Homeless people are sleeping here and we (who is we?) want them to stop”

“Some people in our community don’t have a place to sleep and we (who is we?) think they should”



# What is the Problem to be Solved?

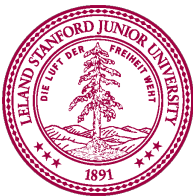
Search Engines

Ratings of Professors



**Problem formulation embeds values**

Piech + Sahami, CS106A, Stanford University



# What are the Problem(s) to be Solved?

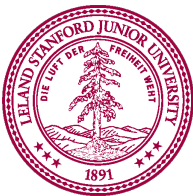
## Ratings of Professors



What are the **problem(s)** to be solved?

For whom are these **problems**? Who would benefit from their solution(s)?

For each problem, who can agree that the problem is worth solving?





# What are the Problem(s) to be Solved?

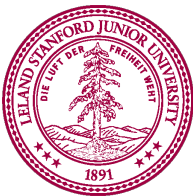
## Search Engines



What are the **problem(s)** to be solved?

For whom are these **problems**? Who would benefit from their solution(s)?

For each **problem**, who can agree that the problem is worth solving?



# 2. Choice of Data Embeds Values

## CS 106A Mid-Quarter Evaluation

\* Required

### Instructor Feedback

These first few questions come from Mehran Sahami, Chris Piech, and Juliette Woodrow. Your anonymous feedback will be reviewed by them, so please be specific and give suggestions for improvement.

What has Mehran been doing so far that has worked well for you? What should he continue doing? \*

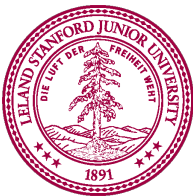
Your answer

What has Mehran been doing so far that has not worked well for you? Is there anything that he should stop or start doing?

Your answer

What has Chris been doing so far that has worked well for you? What should he

- Surveys are cheap to run
- They measure opinions
- What are other ways to measure quality of professors?



# Unicode & Representation

Covers over 1 million symbols,  
Full coverage of 90 languages,  
basic coverage for 200 languages



□  
U+30ED

➤  
U+15D2

◆  
U+2666

○  
U+043E

🚩  
U+2690

↓  
U+2B07

/  
U+FF0F

■  
U+2B1C

🌺  
U+1F490

😞  
U+2639

😊  
U+263B

ℹ  
U+13EA

Adopt a Character +

😞  
U+1F643

Emoji +

Basic Info +

News

❤  
U+1F9E1

Events

Connect +

🌀  
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U+0E07

👤  
U+1D25

🏠  
U+51F8

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U+0B37

Membership +

Press

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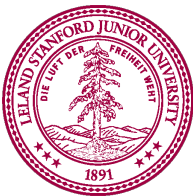
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U+127F

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U+060F

↷  
U+1557

Everyone in the world should be able to use their own language on phones and computers.

[▶ LEARN MORE ABOUT UNICODE](#)



# Unicode: 1 Million Symbols

## Full Coverage for 90 Languages

## Basic Coverage for 200 Languages



# UNICODE: SUCCESSFUL PROCESS FOR IMPROVEMENT

## WELCOME TO THE SCRIPT ENCODING INITIATIVE

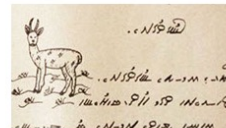
The Script Encoding Initiative (SEI), established in the [UC Berkeley Department of Linguistics](#) in April 2002, is a project devoted to the preparation of formal proposals for the encoding of scripts and script elements not yet currently supported in Unicode (ISO/IEC 10646).

[Unicode](#) is the universal computing standard specifying the representation of text in all modern software. To date, Unicode has largely focused on the major modern scripts, particularly those scripts most widely used in business. Some minority and historic scripts have already been encoded, as well as historic characters of the major modern scripts.



Over [100 scripts remain](#) to be encoded. Minority scripts are still used in parts of South and Southeast Asia, Africa, and the Middle East. Unencoded scripts include Kpelle and Loma. Scripts of historical significance include Book Pahlavi, Large Khitan, and Jurchen. Even for major modern scripts there are many difficult historical issues remaining to be addressed: for example, the

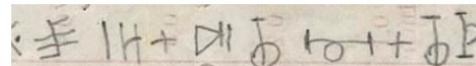
The goal of the SEI project is to fund the preparation of script proposals that will be successfully approved by the Unicode Technical Committee and WG2 (ISO/IEC 10646) without requiring extensive revision or involvement of the committee itself.



A secondary goal to encourage the creation of freely-available Unicode-conformant fonts. This will help to promote widespread adoption and implementation of the scripts.

By providing funding for proposal authors, drawn from faculty and graduate students as well as other experts, the Script Encoding Initiative represents a concerted effort to tackle the remaining scripts and remaining script issues. The project will be assisted by a Unicode Vice President to assure that the proposals meet requirements of the Unicode Technical Committee and of the international standards community. To date, the project has helped get over [70 scripts encoded](#).

The Script Encoding Initiative project is of world-wide importance, for minority and historic scripts. For a minority language, having its script included in the universal character set will help to promote native-language education, universal literacy, cultural preservation, and remove the linguistic barriers to participation in the technological advancements of computing. For historic scripts, it will serve to make communication easier, opening up the possibilities of online education, research, and publication.



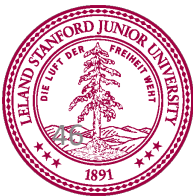
# Unicode is a success story in (at least) two ways

## Inclusive and Representative

- Covers languages spoken by at least 95% of people in the world.

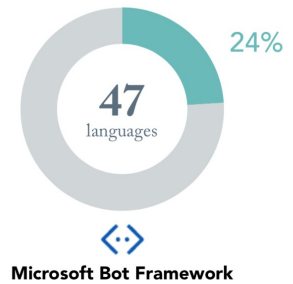
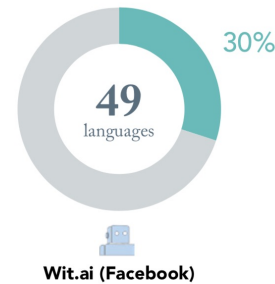
## Successful Process for Improvement

- Unicode has an open-source process by which scholars and speakers of small languages can propose additional scripts.



# NLP & Representation

Compare successes of Unicode with web-based NLP, text and translation services, which work best for well-resourced languages and people

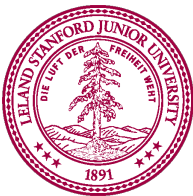


Percentage of those living on less than \$1.50/day whose language is covered by the tool

SOURCE: World Bank, Ethnologue and software provider websites

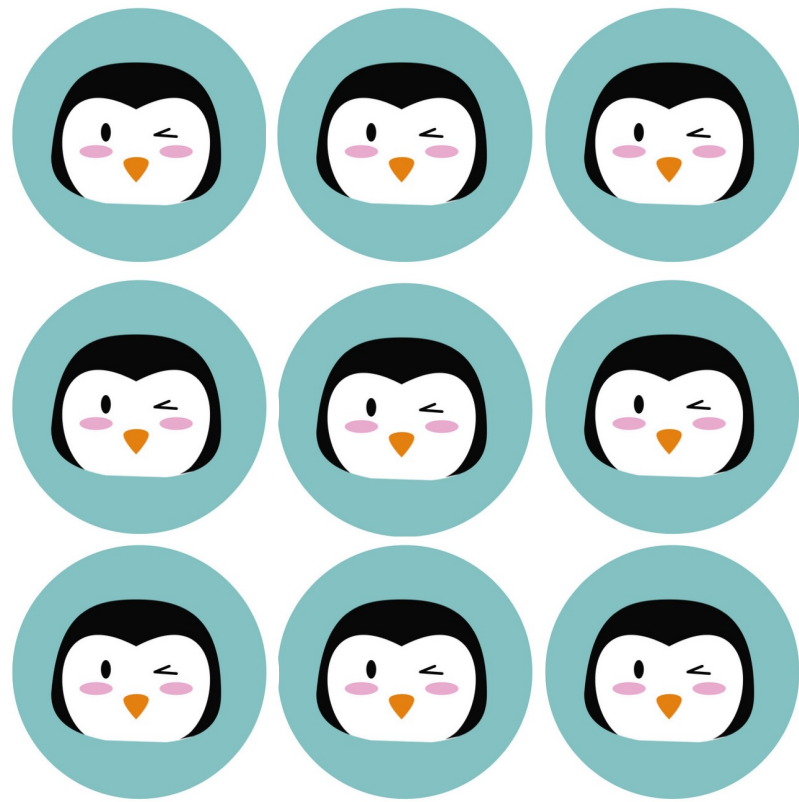


# Underrepresentation & The Long Tail

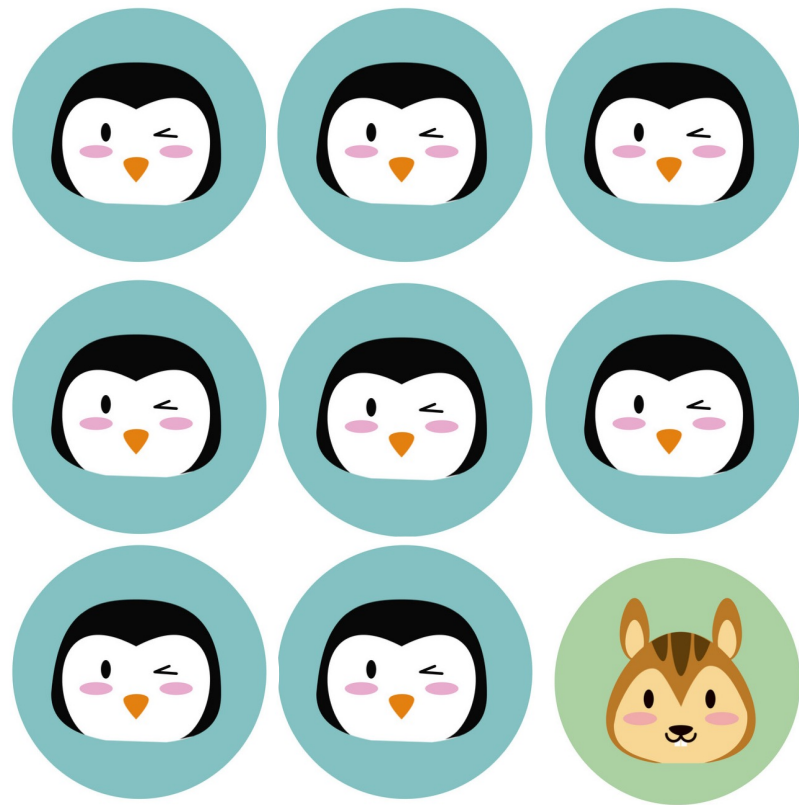




# Representation & Surveys

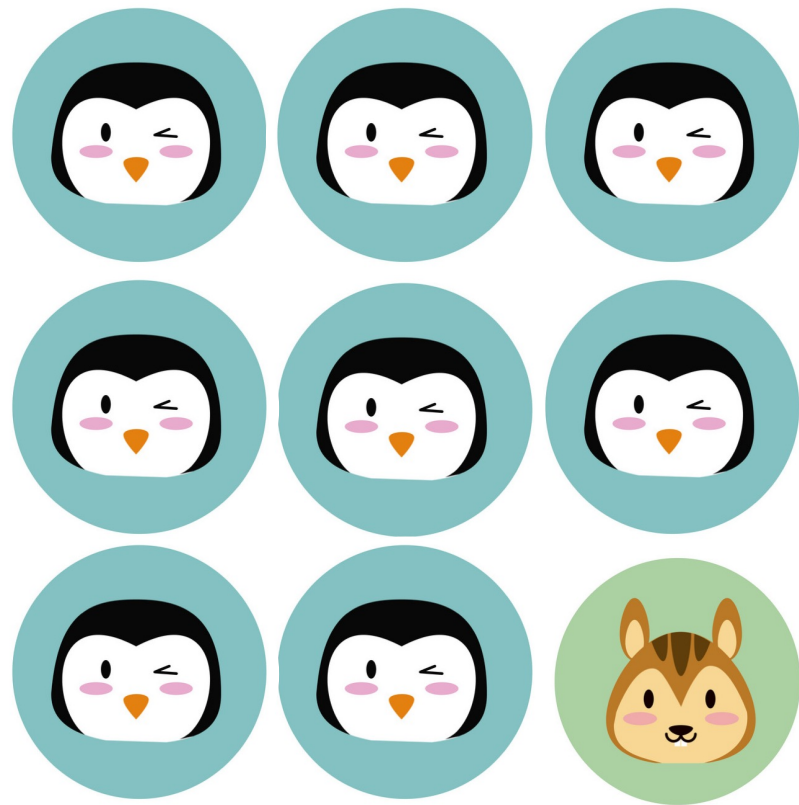


# Representation & Survey Data



If I had a  
different  
experience, my  
ratings may not  
affect the  
numerical  
average - but  
they matter!

# Representation & Search



I want to see  
myself  
represented in  
search in my own  
terms, but other  
people are using  
different terms  
to describe me

# Questions?

Questions?



# Thank you!

**YOU CAN ALWAYS GET IN TOUCH AT  
KCREEL@STANFORD.EDU  
OR PLAN A VISIT TO MY OFFICE HOURS AT  
CALENDLY.COM/KATHLEENCREEL**

