Ethicist Notes:

Slide 1: When one shares Google photos with someone else, a common way to do this is by generating a unique, publicly accessible link. The benefit to this is that it cannot easily be indexed by a search engine or found online except with an impossibly lucky URL guess. If you look carefully, though, there are several ways that the security of such a system could be compromised. For example, someone can gain access to an email in which this link was shared.
Slide 2: Google also harvests metadata from the photos you store, such as your location when you took each photo.
Slide 3: How can we solve this problem and upload, store, and share our images in Google Photos safely and securely? Columbia Engineering researchers think they have an answer with a service they call easy secure photos. They have developed algorithms that encrypt the photos and corresponding thumbnails prior to uploading such that they can only be downloaded and viewed by an authorized computer. This works with both lossy and lossless images. They have found a way to manage the decryption keys so that this can be done easily and securely. Columbia has tested these technologies with a large photo sharing service and is now working with some of the biggest names in photo sharing.
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Gerrymandering Notes:

Slide 1: Just this past Monday, *The Wall Street Journal* reported that the Biden administration had sued Texas saying that the state lawmakers had engaged in discriminatory approval of new legislative districts that dilute voting power. If Washington were right about this, this would be considered gerrymandering.

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Slide 2: But how do we gauge what counts as gerrymandering? And what is gerrymandering? Every ten years, after the Census, legislators and commissions draw new maps and move district lines to account for demographic shifts. To gerrymander is to manipulate district boundaries with a political agenda, and thereby alter election outcomes. As mathematician Jonathan Mattingly puts it, the question is which map we should choose and how we should decide if someone has done a good job in choosing that map.

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Slide 3: Regarding the limits on redistricting, federal law requires that districts have similar numbers of people and as per a Supreme Court precedent set in the 1986 ruling on section 2 of the Voting Rights Act, minorities cannot be split into excessive districts so that their impact is diluted. Given that there are so few legal limits placed on strategic map drawing, and the political benefits can be significant, gerrymandering is widely perceived to be pervasive. Moreover, redistricting to favor incumbents and strategically advance parties can minimize the impact of any one citizen in a democratic election. For instance, in 2012, Democrats won 51 percent of the statewide Pennsylvania congressional vote but secured only five congressional seats according to *The Washington Post.* *The Economist* has come to similar conclusions.

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Slide 4: How does redistricting actually happen?

By computer, of course! Use of computers in the redistricting process became common in the 1990s, and the industry-leading software is known as Maptitude, a program that initially cost as much as $1 million dollars but can now be obtained for as little as 1,000. Maptitude has recently appeared to increase transparency by inviting any concerned citizens to utilize its algorithms with a public-facing version of their software. Gerrymandering schemes include “cracking” - scattering votes for one party across districts, thus diluting their power - and “packing”, stuffing like-minded voters into a single district, wasting the power they would have elsewhere. (MIT Technology Review)

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Slide 5: Algorithms challenging gerrymandering

Algorithms have emerged that determine whether a district has been redistricted in an unlawful or unethical way. These include the redist algorithm and the gerry chain algorithm, both of which are available on GitHub. Legal challenges to partisan gerrymanders through algorithmic outlier analysis have been successful at the district and state supreme court level on several occasions. In 2017, The Supreme Court ruled 5-4 that decisions about what counts as gerrymandering should not be made by the judicial branch Many of these algorithms use what are known as Markov chains to create random walks on what are known as graph partitions. They try to determine whether the district map could be considered an extreme outlier based on strategically generating a very large number of hypothetical redistricting maps and comparing the actual map against those.

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Slide 6: Solution

If Americans lack recourse with a restraintist Supreme Court and weak laws, there may still be a litigious solution with the help of these freely available programs. If greater access to these policing algorithms leads to more information and transparency, more manipulative map makers could be stopped in the local courts as has been happening of late. Algorithmic results are accepted by many courts as damning evidence.

Going the legislative route, on the other hand, is still a possibility. The For the People Act was passed by the House along party lines but filibustered in the Senate in June. If a version of this legislation were passed, It would also enhance the ability of voters to challenge racially or politically discriminatory maps in court, require meaningful transparency in the map-drawing process, and mandate the use of independent commissions to draw maps. opportunities for the public to review and comment on proposed maps, and public access to underlying data and software so that members of the public can analyze maps and/or create and propose alternatives” The hope for future policing of gerrymandering may lie with the computer science students we are currently teaching.

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Slide 7: Classroom Connections

We created a lesson that allows students to explore and analyze data involving possible Gerrymandering. In the lesson, students will perform methods on tables and write functions to analyze data from a dataset of Republican and Democratic votes for US Representatives from 2018 in order to investigate gerrymandering. The dataset comes from bootstrapworld.org and is based on US Census Bureau data. The code for the program is in Pyret.

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Slide 8: Pyret Code

Pyret is a language for learning programming. There are clear error messages that help students improve their code. In order to access the Pyret code provided with the lesson, log in to code.pyret.org and connect your google drive. Then click on the links for the code.

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Slide 9: Links for Gerrymandering Lesson Plan

The lesson contains the lesson plan and slides with a Peardeck, the Gerrymandering Dataset from Bootstrap, the code for the project and an example.