



Newspaper Navigator: Hosting the Dataset and Deploying the Search Application

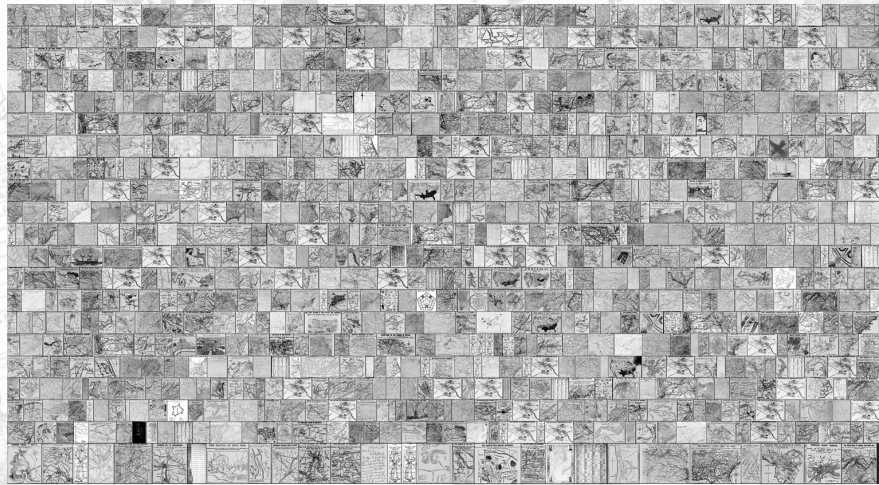
Chris Adams & Benjamin Charles Germain Lee

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news-navigator.labs.loc.gov

PAUL G.
ALLEN
SCHOOL
W

I. The Newspaper Navigator Dataset



news-navigator.labs.loc.gov

Weather Forecast
Partly cloudy with showers
Temperature 65-75

The Evening Star

Guide for Readers
Subscription Rates
Single Copies 5c

NAZI COUNTERATTACKS REPULSED NEAR CAEN

Allied Infantry Pushes 10 Miles North of Rome

8th Army Fights Break Action; 5th Sees Little of Fighting



NAZI COUNTERATTACKS NEAR CAEN, FRANCE, REPELLED BY ALLIED INFANTRY. (AP Wirephoto)

Allies Clear Enemy From Landing Areas, Battle Raging Inland

Beachheads Extend Over 50 Miles; Both Sides Suffer in Air Warfare

German retires People if Conquered Nation

APRIL 25 (AP)—The German High Command has ordered that the German people be treated as a conquered nation if the Allies should capture any part of Germany.



People of the north live at a leading credit American bank and work near the beach of Caen.

50 Keep Wright Plan die Despite Appeal

APRIL 25 (AP)—Fifty members of the House of Representatives today voted to keep the Wright plan for the proposed new Federal Reserve Bank.

APRIL 25 (AP)—The House of Representatives today rejected an appeal for the repeal of the Wright plan for the proposed new Federal Reserve Bank.

9 Billions for Army

APRIL 25 (AP)—The House of Representatives today approved a bill for the appropriation of \$9 billion for the Army.

3,000 Sorries Flow

APRIL 25 (AP)—Three thousand letters of sympathy were received by the family of a fallen soldier.

Struck Ending Job

APRIL 25 (AP)—A strike of workers ended with a settlement by the National Labor Relations Board.

S. Compromise Seen

APRIL 25 (AP)—A compromise bill for the proposed new Federal Reserve Bank is expected to pass the Senate.

60 Billion Debt Limit

APRIL 25 (AP)—The House of Representatives today approved a bill for the increase of the national debt limit to \$60 billion.

New National Cemetery

APRIL 25 (AP)—The War Relocation Authority today announced plans for a new national cemetery.

DT Hits Civilian Travel

APRIL 25 (AP)—The Defense Transportation Administration today announced restrictions on civilian travel.

Help Center Comes of The Star

APRIL 25 (AP)—A new help center for the public is being established by The Evening Star.

Supreme Headquarters Allied Expeditionary Force

APRIL 25 (AP)—The Supreme Headquarters Allied Expeditionary Force today announced that the 8th Army has captured the town of Caen.

London (AP)—

APRIL 25 (AP)—London today reported that the 8th Army has captured the town of Caen.

By Mrs. Gallagher

APRIL 25 (AP)—The Supreme Headquarters Allied Expeditionary Force today announced that the 8th Army has captured the town of Caen.

Report Blue Improvement

APRIL 25 (AP)—A report on the improvement of the blue ink used in the printing of the Constitution.

The Drama and the War of the Wonders

APRIL 25 (AP)—The drama and the war of the wonders in the life of a soldier.

Ship Built for China

APRIL 25 (AP)—A ship built for China is being launched today.

44 Airman Return Home

APRIL 25 (AP)—Forty-four airman are returning home today.

Red Public Opinion
The Public Opinion Poll
The Public Opinion Poll
The Public Opinion Poll

THE WONDERS OF THE WORLD

Comic strip panels showing various scenes and characters.

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Comic strip panels showing various scenes and characters.

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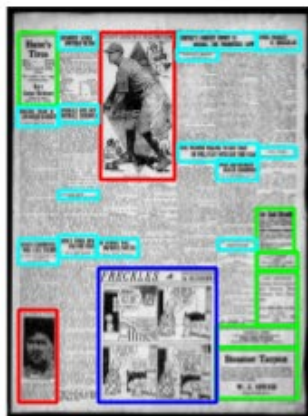
RADIO PROGRAM

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Download Image,
METS/ALTO OCR



Run Visual Content
Recognition



Crop and Save
Visual Content



Generate
Image
Embeddings

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<alio xmlns="http://www.loc.gov/standards/alto/ns-v2#"
  <description>
    <measurementUnit>inch1200//measurementUnit</>
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    <ocrProcessingStep>
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    </ocrProcessingStep>
  </alioProcessing>
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  </alio>
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OCR

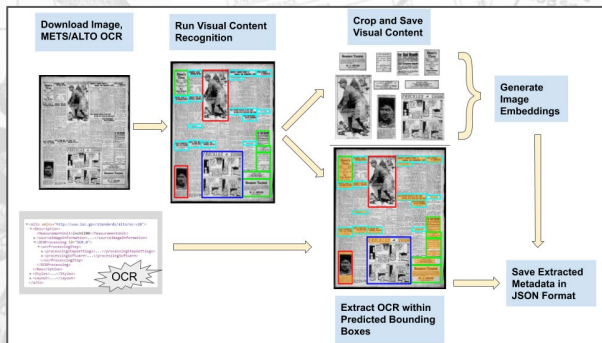


Extract OCR within
Predicted Bounding
Boxes

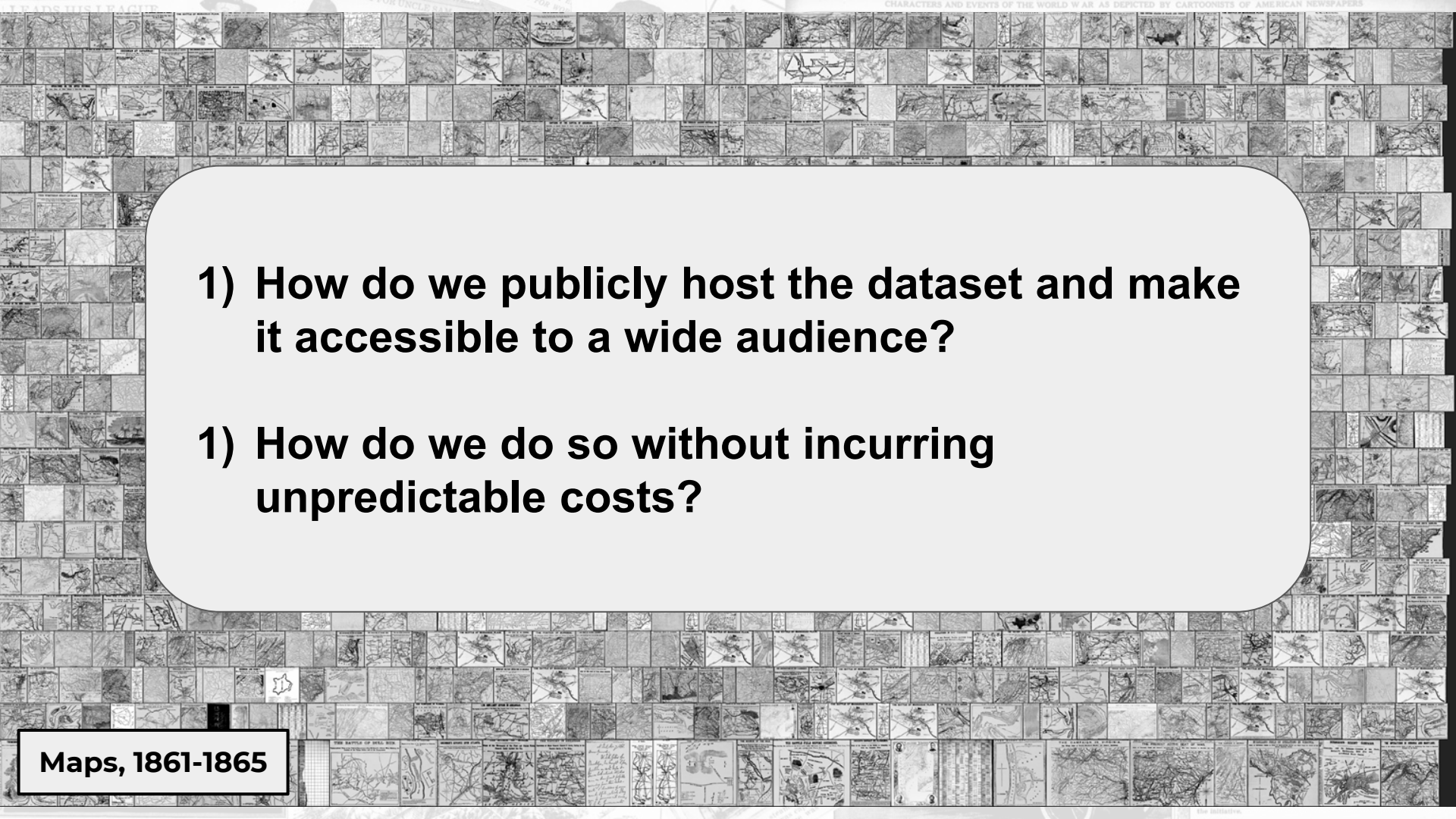
Save Extracted
Metadata in
JSON Format

Running the Pipeline

- 16,368,041 *Chronicling America* pages processed (99.998%)
 - ~100 TB of image & XML data
- ~19 days on 2 g4dn.12xlarge Amazon AWS EC2 instances
 - 96 vCPUs & 8 NVIDIA T4 GPUs



x 16.3 million pages

- 
- 1) How do we publicly host the dataset and make it accessible to a wide audience?
 - 1) How do we do so without incurring unpredictable costs?

Maps, 1861-1865

news-navigator.labs.loc.gov

- 2 primary forms of access:
 - For computation: S3 requests under the “requester pays” model
 - For public use: prepared datasets (no coding or S3 necessary)

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About Work Events LC for Robots

Experiments

Newspaper Navigator

Explore the visual and textual content within the Chronicling America digitized newspaper collection in new ways using machine learning!

Overview

Welcome to the Newspaper Navigator dataset! This dataset consists of extracted visual content for 16,358,041 historic newspaper pages in Chronicling America. The visual content was identified using an object detection model trained on annotations of World War I-era Chronicling America pages, including annotations made by volunteers as part of the Beyond Words crowdsourcing project. The resulting visual content recognition model detects the following types of visual content:

1. Photograph
2. Illustration
3. Map
4. Comic/Caricature
5. Editorial/Cartoon
6. headline
7. Advertisement

The dataset also includes text corresponding to the visual content, identified by extracting the Optical Character Recognition, or OCR, within each predicted bounding box. For example, if the visual content recognition model predicted a bounding box around a headline, the corresponding textual content provides a machine-readable version of the headline. Likewise, for a photograph, illustration, or map, this textual representation often contains the title and caption.

II. The Newspaper Navigator Search Application

Search My Collection Train My AI Navigators Chroniling America LC Labs Data Archaeology About

Save

Select an AI navigator:

baseball players

+ New AI Navigator

(+) The AI navigator will try to find photos like the ones selected below!

Train Your AI Navigator!

(-) The AI navigator will try to avoid photos like the ones selected below!

baseball players

Below, your AI navigator has found visually similar photos based on the selections on the left. You can re-train your AI navigator by adjusting your selections on the left and making new selections below.

THE NATION'S GOING DRY.

WHITE-Iny. BLACK-Iny. Train

news-navigator.labs.loc.gov/search

Newspaper Navigator Search Application

- A search user interface for 1.5 million photos from the Newspaper Navigator dataset
- Empowers users to train open facets (“AI navigators”) to retrieve visually similar content
- Exposes the machine learning training to the user
- Training & predicting on all 1.5 million photos is nearly instantaneous

The screenshot displays the Newspaper Navigator Search Application interface. At the top, there are navigation tabs: "Search", "My Collection", "Train My AI Navigators", "Chronicling America", "LC Labs", "Data Archaeology", and "About".

The main content area is titled "baseball players". Below the title, there is a section for "Save" with the text: "(+) The AI navigator will try to find photos like the ones selected below!". This section shows a grid of 10 baseball player photos, with 6 of them highlighted with green borders.

Below that, there is a section for "New AI Navigator" with the text: "(-) The AI navigator will try to avoid photos like the ones selected below!". This section shows a grid of 6 photos, with 5 of them highlighted with blue borders.

On the right side of the interface, there is a section titled "baseball players" with the text: "Below, your AI navigator has found visually similar photos based on the selections on the left. You can re-train your AI navigator by adjusting your selections on the left and making new selections below." This section shows a grid of 20 baseball player photos.

At the bottom right, there is a map of the United States with the text "THE NATION'S GOING DRY." and "WHITE—Yes. BLACK—No." and "Number of prohibition states: 20. The District of Columbia is dry by act of Congress. Alaska is dry by a vote of the people passed by Congress. The Pure Food and Drug Act, passed by the Sixty-fourth Congress, provides for prohibition in the inland subject to a referendum. Including the dry territory in wet states, more than 80 per cent of the area of the United States and more than 50 per cent of the population are under prohibition. Eight states are in prohibition campaigns. Two of these—New York and Utah—already have statutory prohibition and in November will vote to make it constitutional. New Mexico also will vote on the question next November; others in November, 1918. This is a nationwide fight through the initiative."

Search My Collection

Train My AI Navigators

Chronicling America

LC Labs

Data Archaeology

About

Save

Select an AI navigator:

baseball players

+ New AI Navigator

(+) The AI navigator will try to find photos like the ones selected below!



Train Your AI Navigator!

(-) The AI navigator will try to avoid photos like the ones selected below!



baseball players

Below, your AI navigator has found visually similar photos based on the selections on the left. You can re-train your AI navigator by adjusting your selections on the left and making new selections below.



<https://news-navigator.labs.loc.gov/search>



Challenges Surrounding the Search Application's Deployment

- How do we create a sustainable solution for deploying the search application with low maintenance requirements?
- How do we handle issues surrounding load at launch without over-paying the rest of the time?
- How do we ensure that the interactive machine learning component is fast and is not a challenge for upkeep?

Search My Collection Train My AI Navigators Chroniling America IC Labs Data Archaeology About

Select an AI navigator:

baseball players

Save

(+) The AI navigator will try to find photos like the ones selected below!

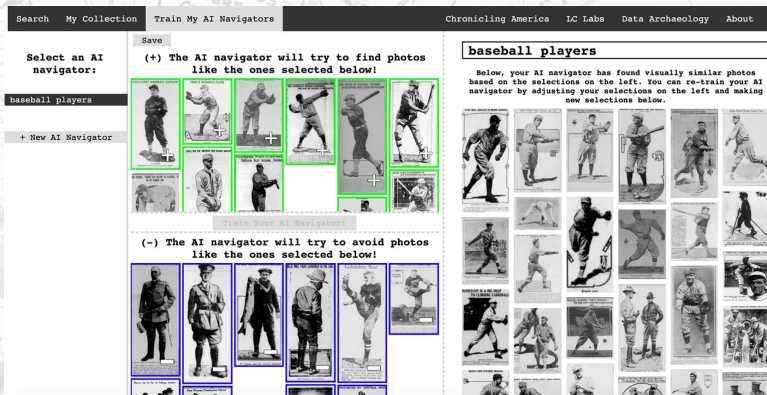
(-) The AI navigator will try to avoid photos like the ones selected below!

baseball players

Below, your AI navigator has found visually similar photos based on the selections on the left. You can re-train your AI navigator by adjusting your selections on the left and making new selections below.

Solution: Containerization & AWS Fargate!

- Containers are designed to be ephemeral, with no state to preserve except where it's explicitly configured
- Automated container build process (see GitHub repo), making it easy to ship security updates and for new people to use the project
- We deployed the container on AWS ECS Fargate: no host servers or configuration to manage, auto-scaling policy adds and removes instances based on load or failures, health checks avoid accidentally deploying a broken build



18 Months since Deployment...

- Running continuously for a year and a half with virtually no issues!
- Supported tens of thousands of user sessions to date
- Engagement from scholars, teachers, students, genealogists, and members of the American public
- More usage statistics are forthcoming in a *Signal* blog post with LC Labs!

The screenshot displays the 'AI Navigator' interface. At the top, there are navigation tabs: 'Search', 'My Collection', 'Train My AI Navigators', 'Chroniling America', 'LC Labs', 'Data Archaeology', and 'About'. Below the tabs, there are sections for 'Save', 'Select an AI navigator:', and 'baseball players'. The main area shows a grid of images with green and blue borders, indicating selections. Text instructions explain how to use the AI navigator to find or avoid photos based on selections. A search bar at the bottom contains the text 'baseball players'.

Search My Collection Train My AI Navigators Chroniling America LC Labs Data Archaeology About

Save
(+) The AI navigator will try to find photos like the ones selected below!

Select an AI navigator:
baseball players

+ New AI Navigator

baseball players

Below, your AI navigator has found visually similar photos based on the selections on the left. You can re-train your AI navigator by adjusting your selections on the left and making new selections below.

(-) The AI navigator will try to avoid photos like the ones selected below!

Newspaper Navigator Resources

- Dataset: <https://news-navigator.labs.loc.gov/>
- Search Application: <https://news-navigator.labs.loc.gov/search>
- GitHub repository: <https://github.com/LibraryOfCongress/newspaper-navigator>

Acknowledgments

We would like to thank:

- Jaime Mears, Eileen Jakeway, Meghan Ferriter, Laurie Allen, Abbey Potter, Leah Weinryb Grohsgal, Kate Zwaard, Deb Thomas, Nathan Yarasavage, Robin Butterhof, Tong Wang, John Foley, Megan Halsband, Brian Foo, Mark Sweeney, the entire NDNP staff at the Library of Congress, and everyone who has made *Chronicling America + Beyond Words* possible
- Dan Weld at the University of Washington

Acknowledgments

- This research is based upon work supported by the **National Science Foundation Graduate Research Fellowship** under **Grant DGE-1762114** and the **Library of Congress Innovator in Residence** position.

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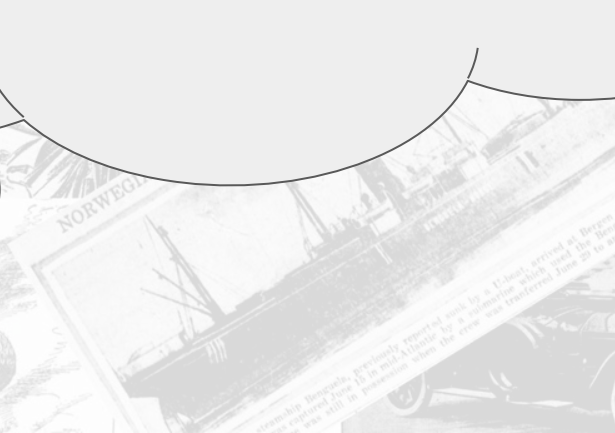
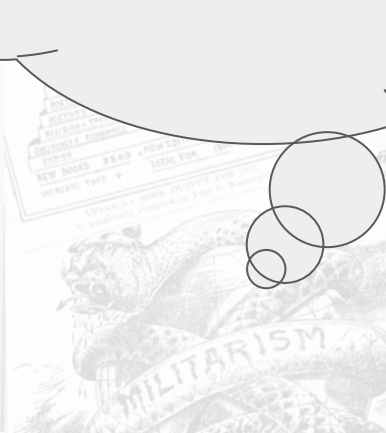
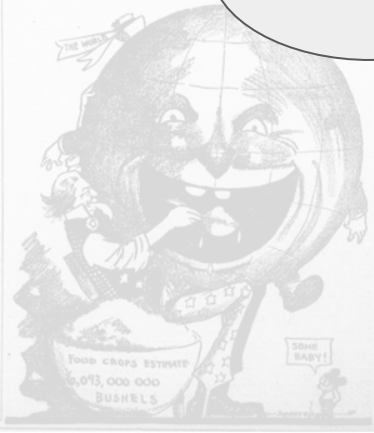
LEADS HIS LEAGUE ON INITIAL SACK

CHARACTERS AND EVENTS OF THE WORLD WAR AS DEPICTED BY CARTOONISTS OF AMERICAN NEWSPAPERS



Questions?

Enough For Everybody



THE NATION'S GOING DRY.

WHITE—Dry. **BLACK**—Wet.

Number of prohibition states, 28. The District of Columbia is dry by act of congress. Alaska is dry by a vote of the people ratified by congress. The Four States comprising bill, passed by the Sixty-fourth congress, provide for prohibition in the island subject to a referendum. Including the dry territory in wet states, more than 82 per cent of the area of the United States and more than 60 per cent of the population are under prohibition.

Eight states are in submission campaigns. Two of these—New York and Utah—already have statutory prohibition and in November will vote to make it constitutional. New Mexico will vote on the question next November; others in November, 1918. This is a wet-and-dry fight through the initiative.