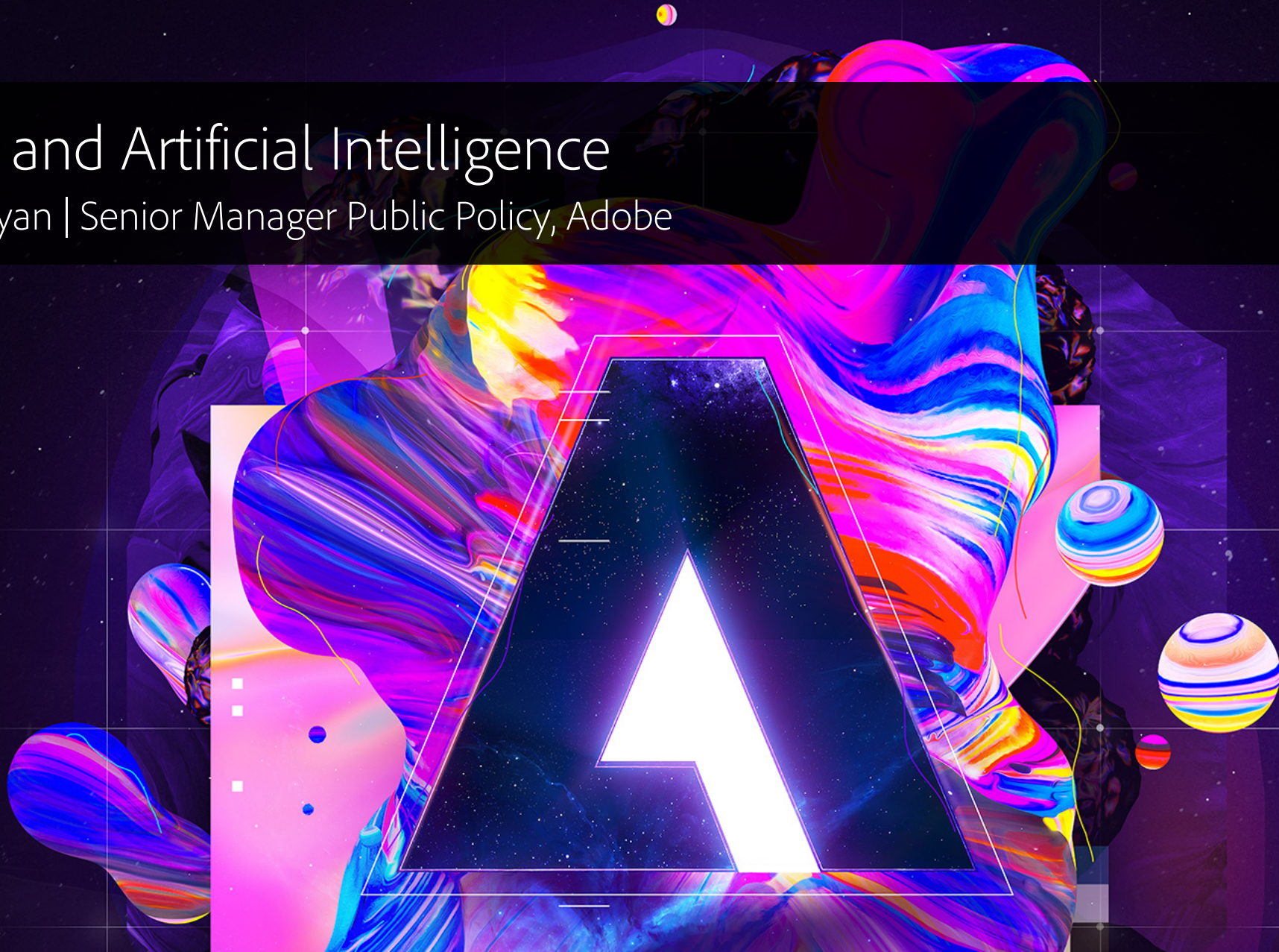




Adobe and Artificial Intelligence

Julie Babayan | Senior Manager Public Policy, Adobe



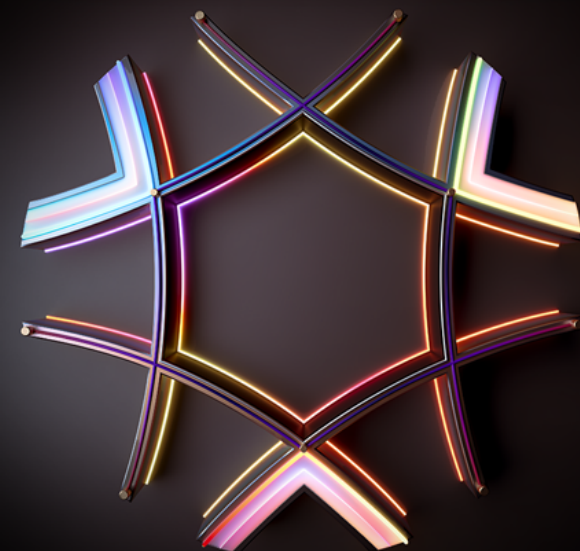
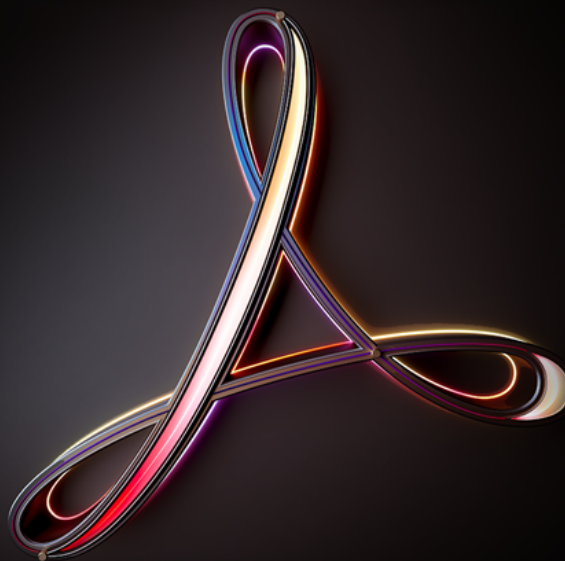
#AdobeRemix
Vasjen Katro / Baugasm

Empowering

People to Create

Transforming

How Businesses Compete



Adobe Sensei

Adobe Creative Cloud: Platform for Creativity



DESKTOP



MOBILE



COMMUNITY



MARKETPLACE

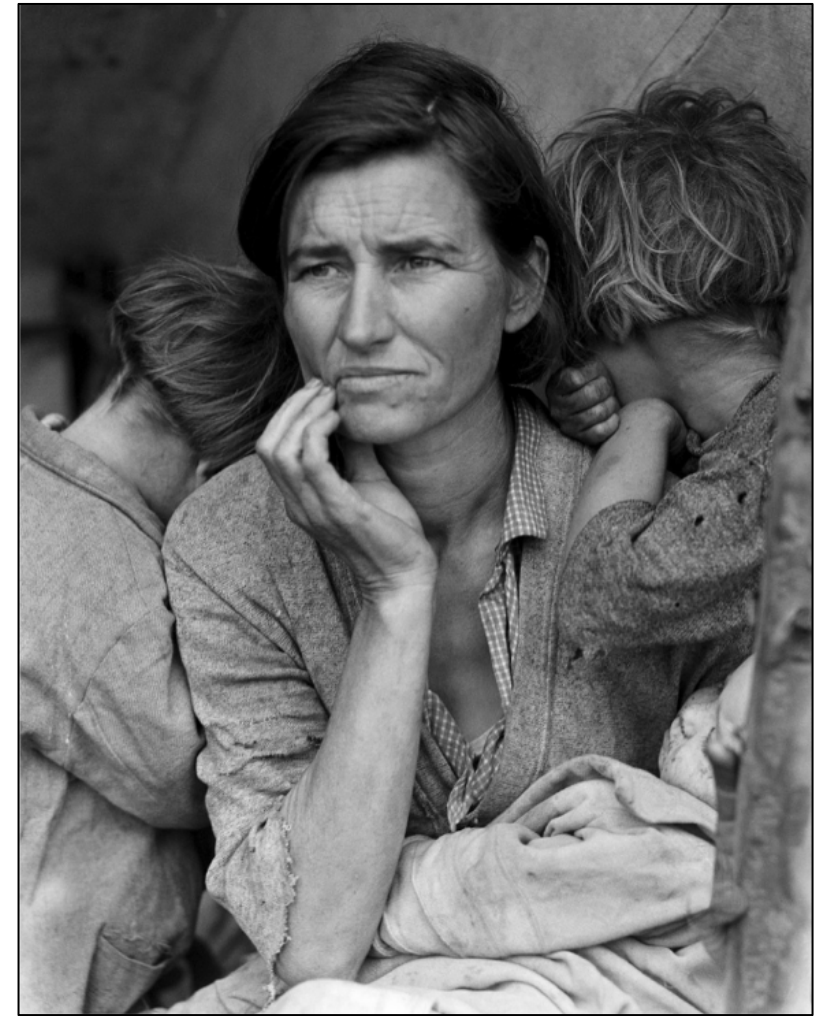


WEB

Adobe Sensei

Using AI to Color Black & White Photos

- We seek to colorize black-and-white photographs.
- Could gain new insights from historic photos.
 - But tedious and time-consuming to do by hand
- Colors depend on what is in the picture
 - This is an AI problem, i.e., the algorithm needs to “understand” the content as a whole.

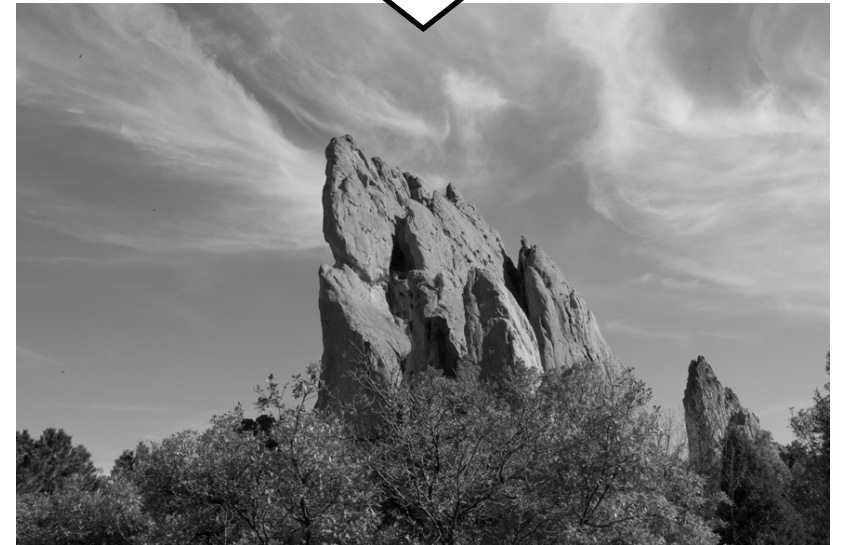


Migrant Mother by Dorothea Lange, 1936.

Library of Congress, Prints & Photographs Division, FSA/OWI Collection, reproduction number: LC-USF34-9058-C

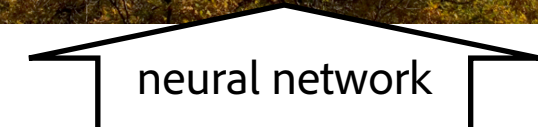
A Problem Well-suited for AI

- Training data are straightforward to generate
 - Convert a color photo to black-and-white
 - We can get as much training data as we need

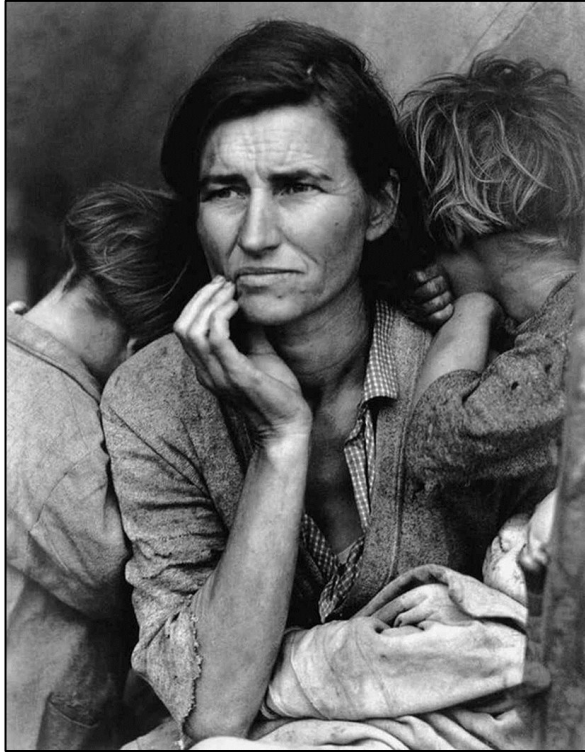


A Problem Well-suited for Deep Learning

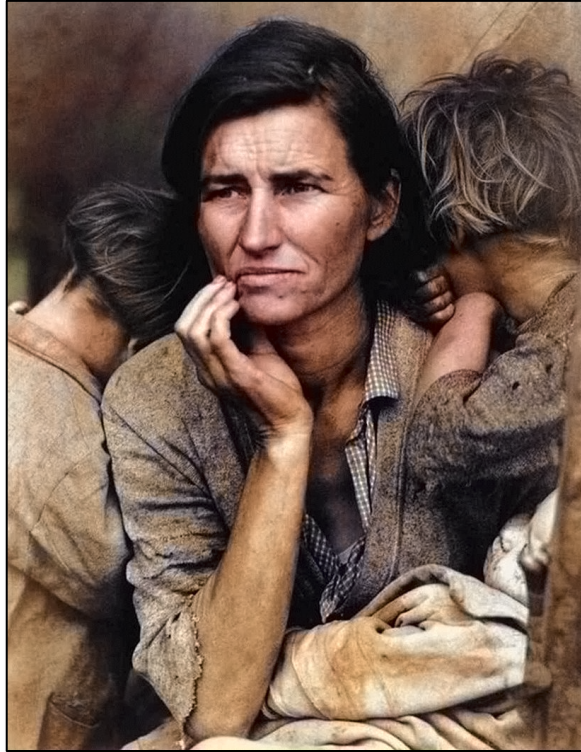
- Training data are straightforward to generate
 - Convert to black-and-white any color picture
 - We can get as much training data as we need
- Train a neural network to predict the color version given the black-and-white image



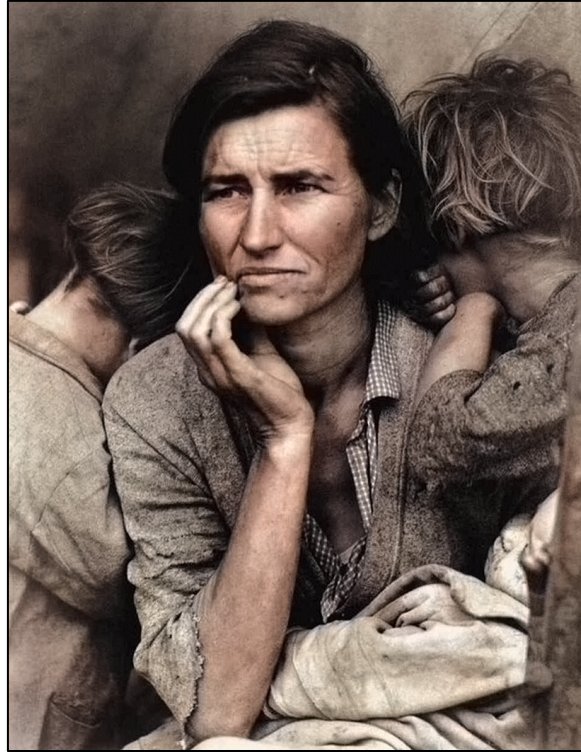
Automatic Results



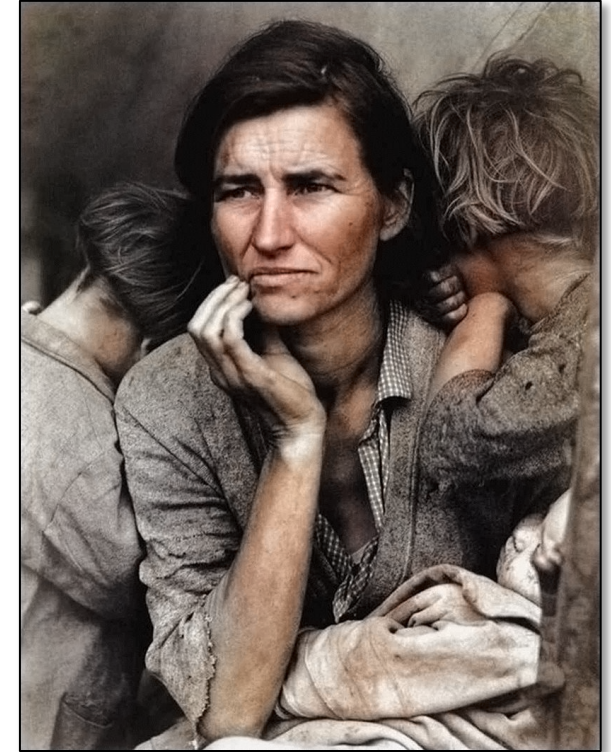
Grayscale Input



Zhang, Isola, Efros.
ECCV 2016.



Larsson *et al.*
ECCV 2016.



Iizuka *et al.*
SIGGRAPH 2016.

☹ Mostly gray and brown

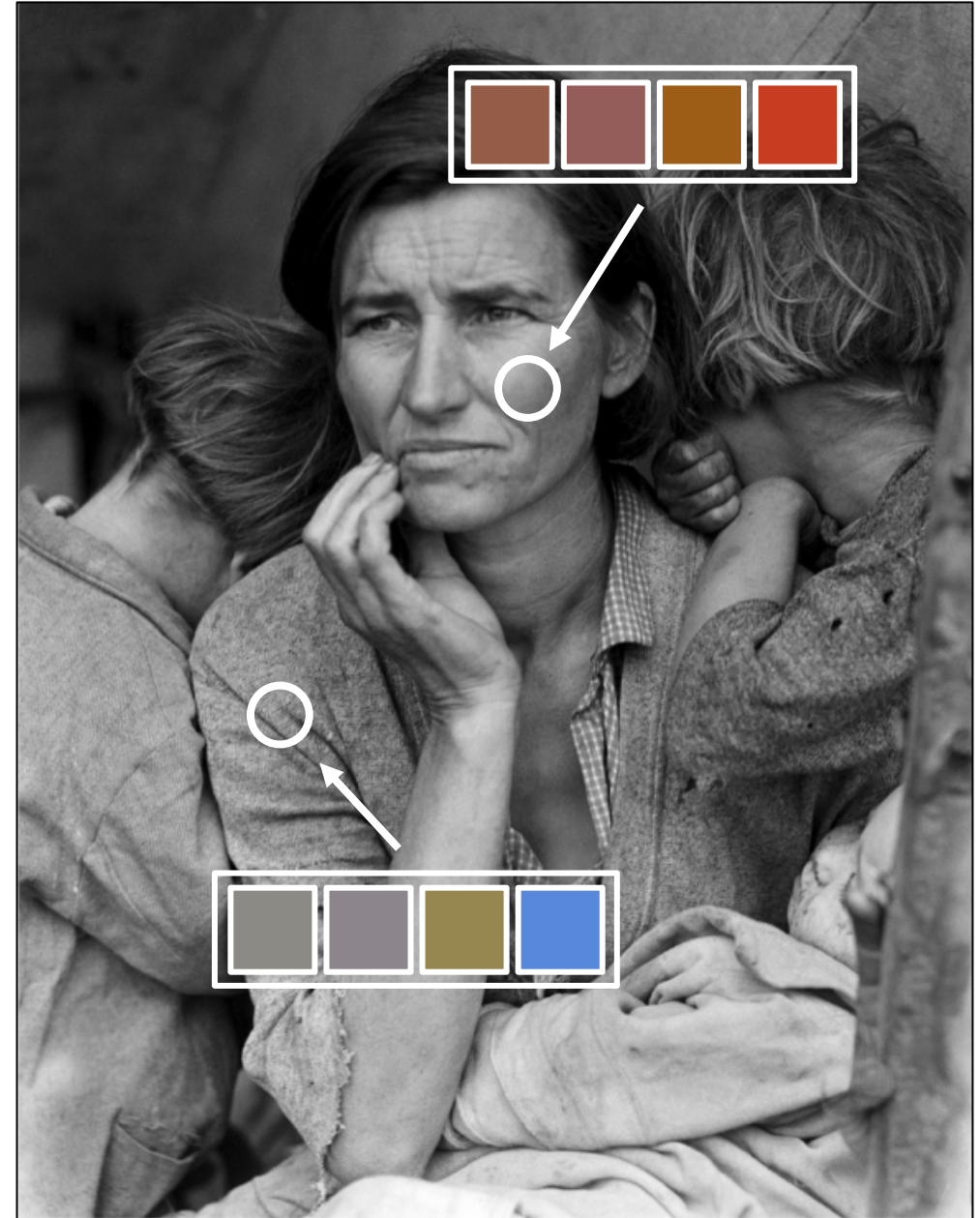
Color Ambiguity

- Some colors are well defined, e.g., skin tones.
- Some colors are not well defined, e.g., clothes
- Ambiguity is a very hard problem to solve.



Adobe's Approach: Let the Artist Decide

- The artist is in control.
 - The AI is merely a tool to help the artist.





Dorothea Lange
Migrant Mother, 1936.

Library of Congress, Prints & Photographs
Division, FSA/OWI Collection, reproduction
number: LC-USF34-9058-C



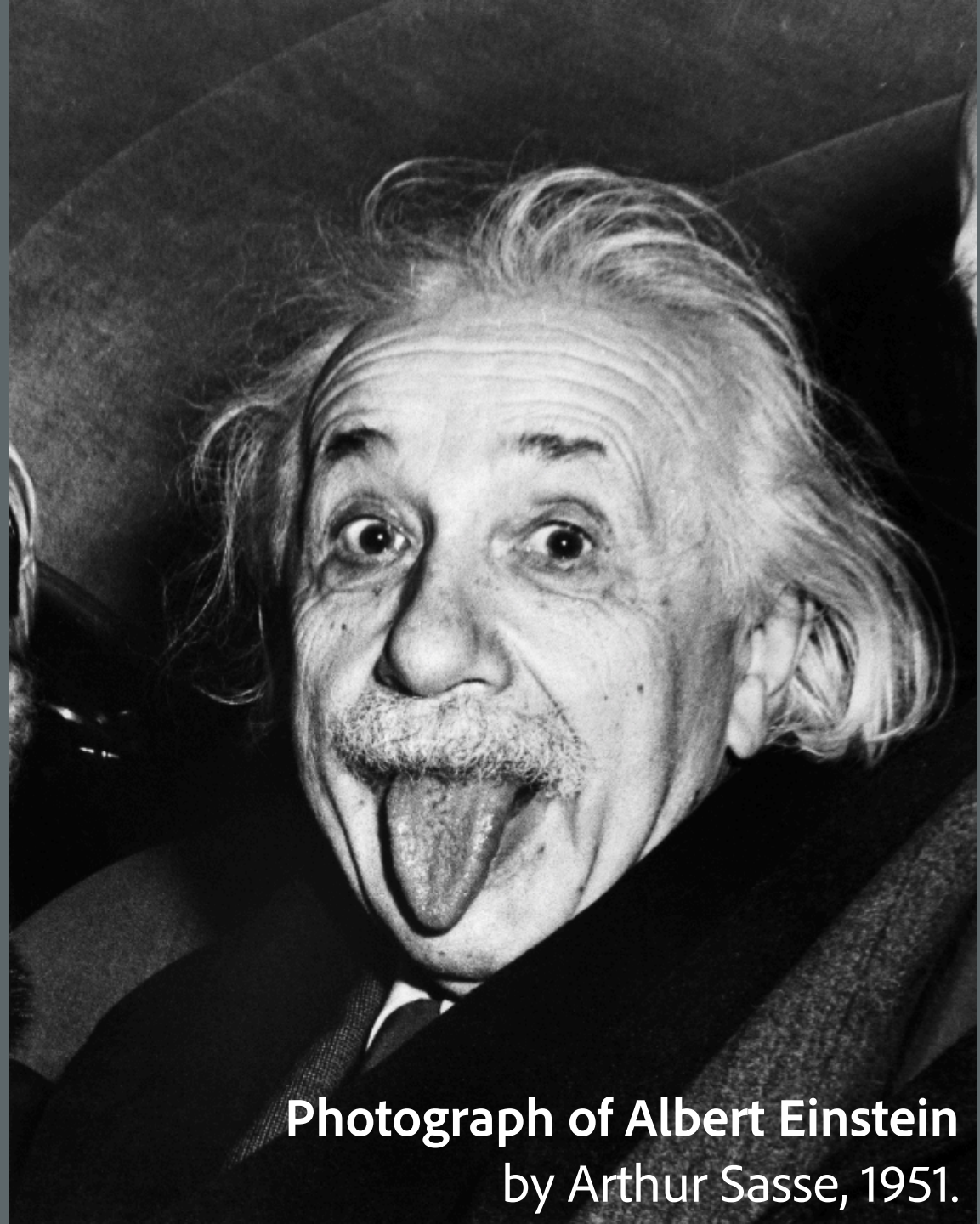
Dorothea Lange
Migrant Mother, 1936.

Library of Congress, Prints & Photographs
Division, FSA/OWI Collection, reproduction
number: LC-USF34-9058-C

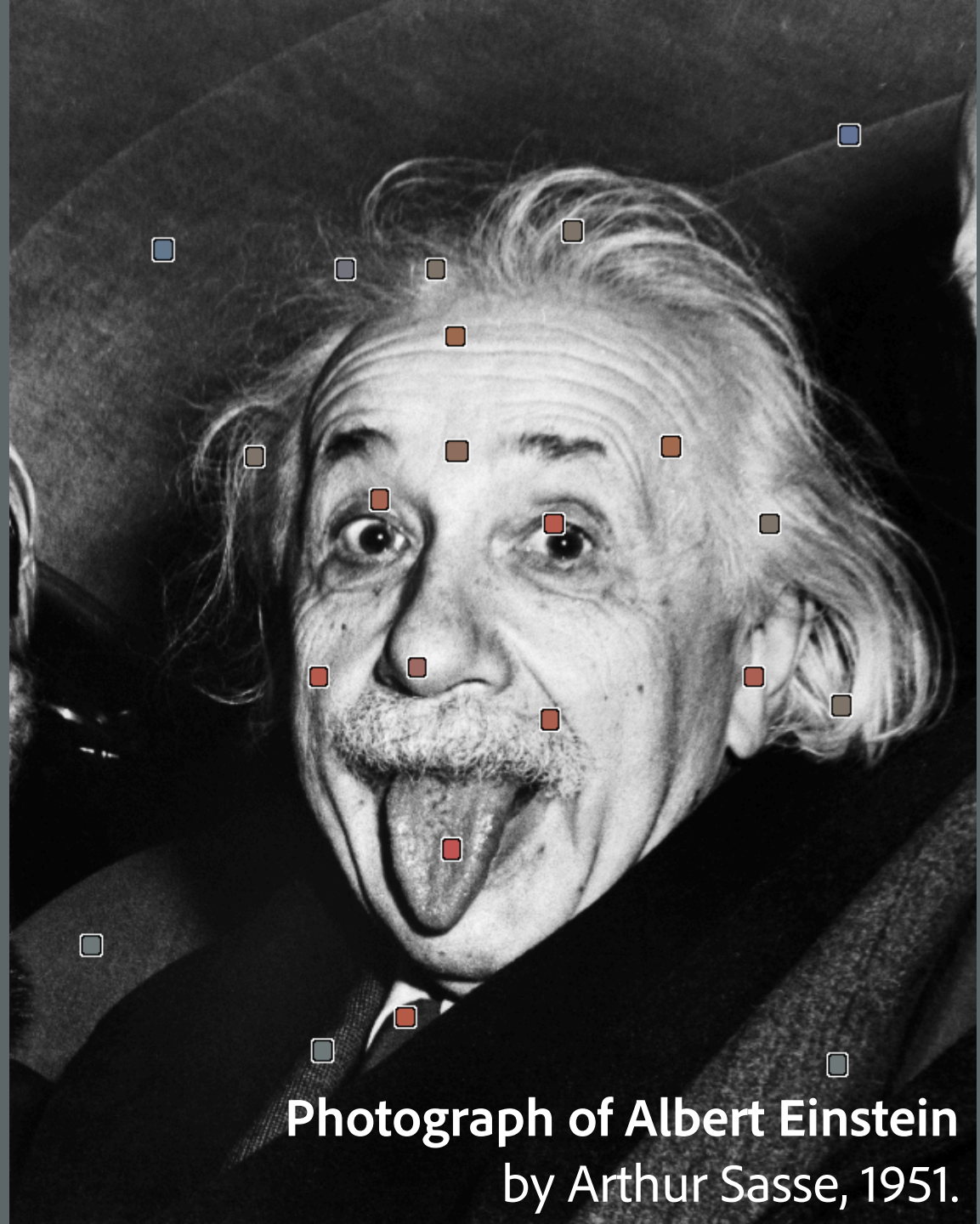


Dorothea Lange
Migrant Mother, 1936.

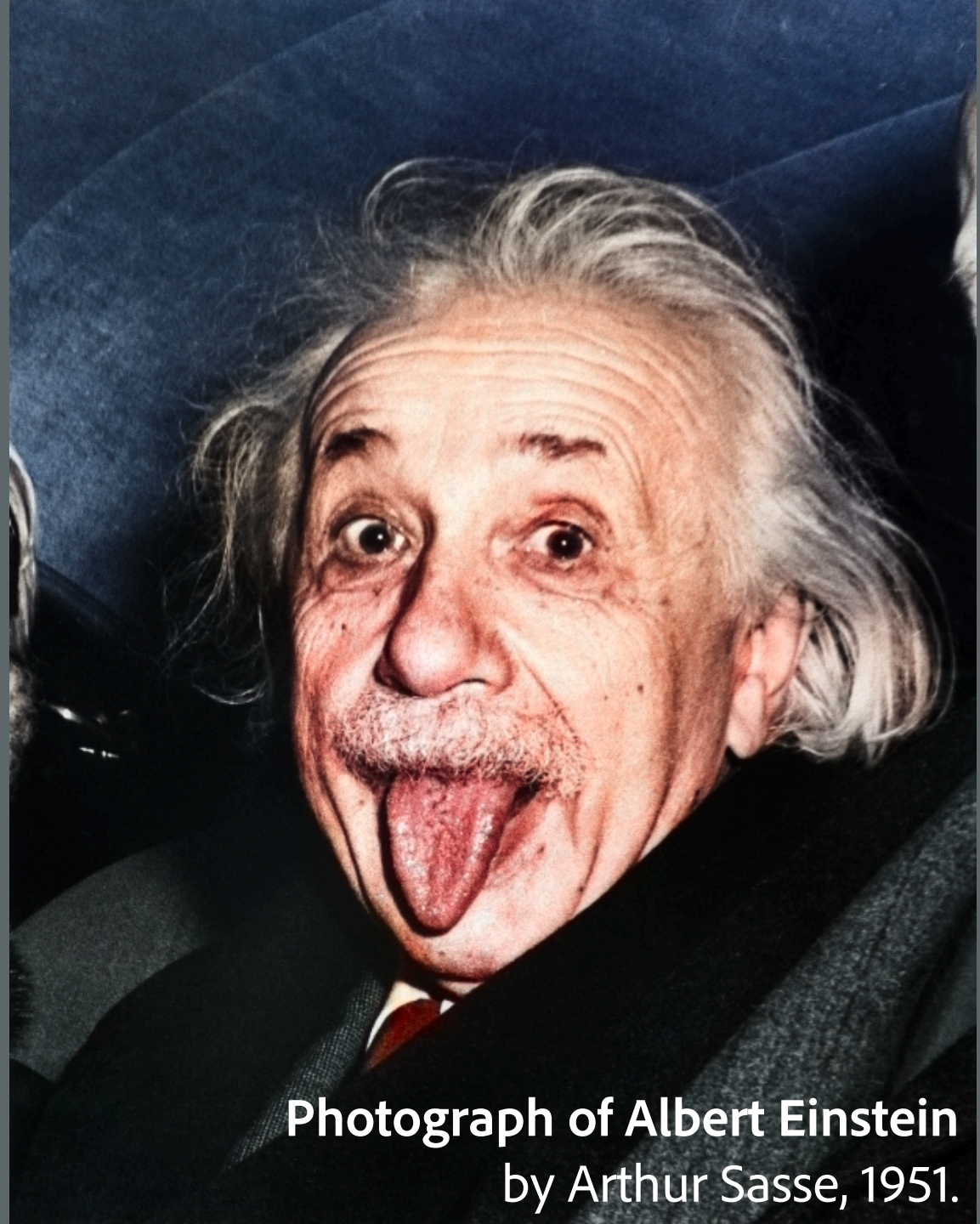
Library of Congress, Prints & Photographs
Division, FSA/OWI Collection, reproduction
number: LC-USF34-9058-C



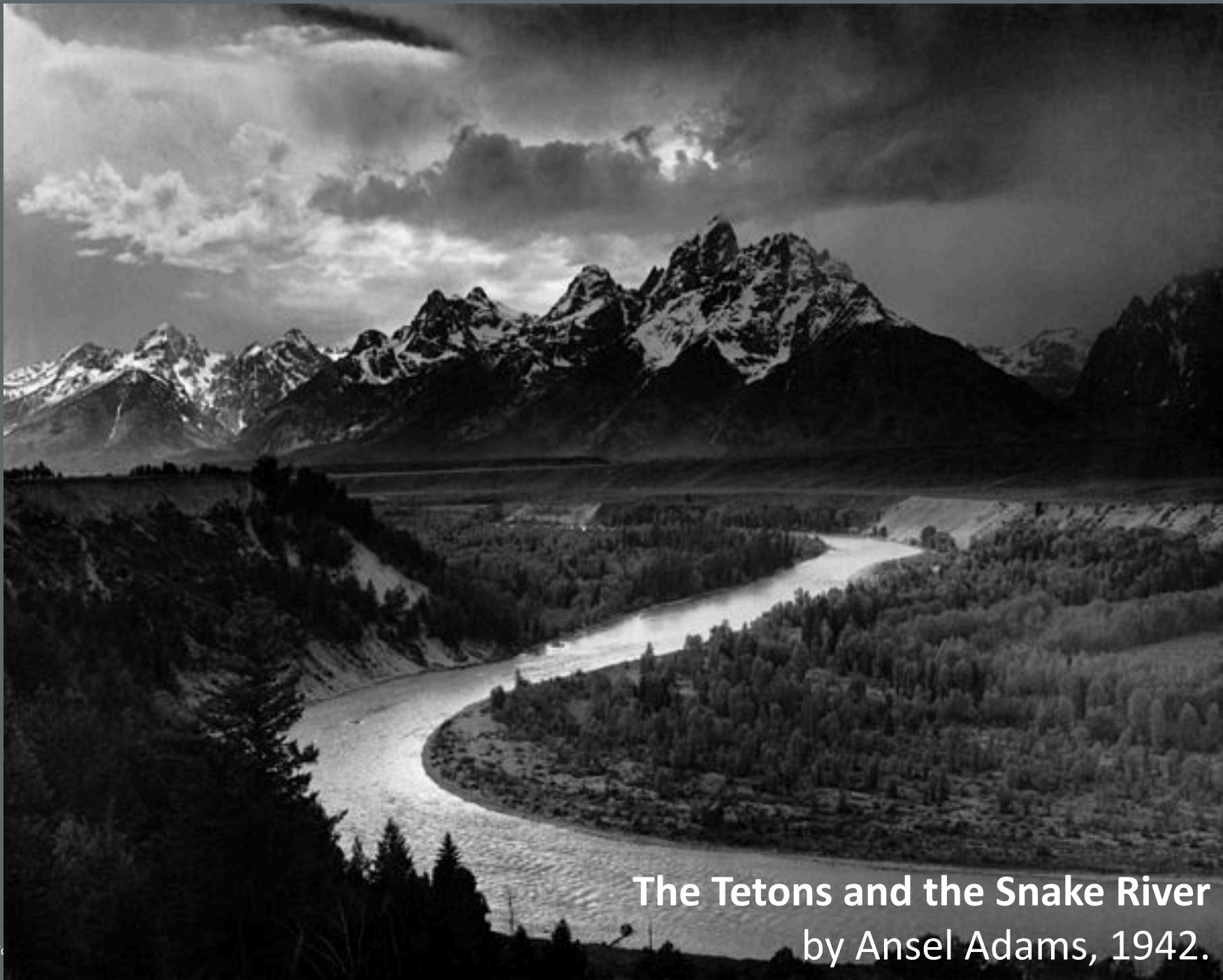
Photograph of Albert Einstein
by Arthur Sasse, 1951.



Photograph of Albert Einstein
by Arthur Sasse, 1951.



Photograph of Albert Einstein
by Arthur Sasse, 1951.



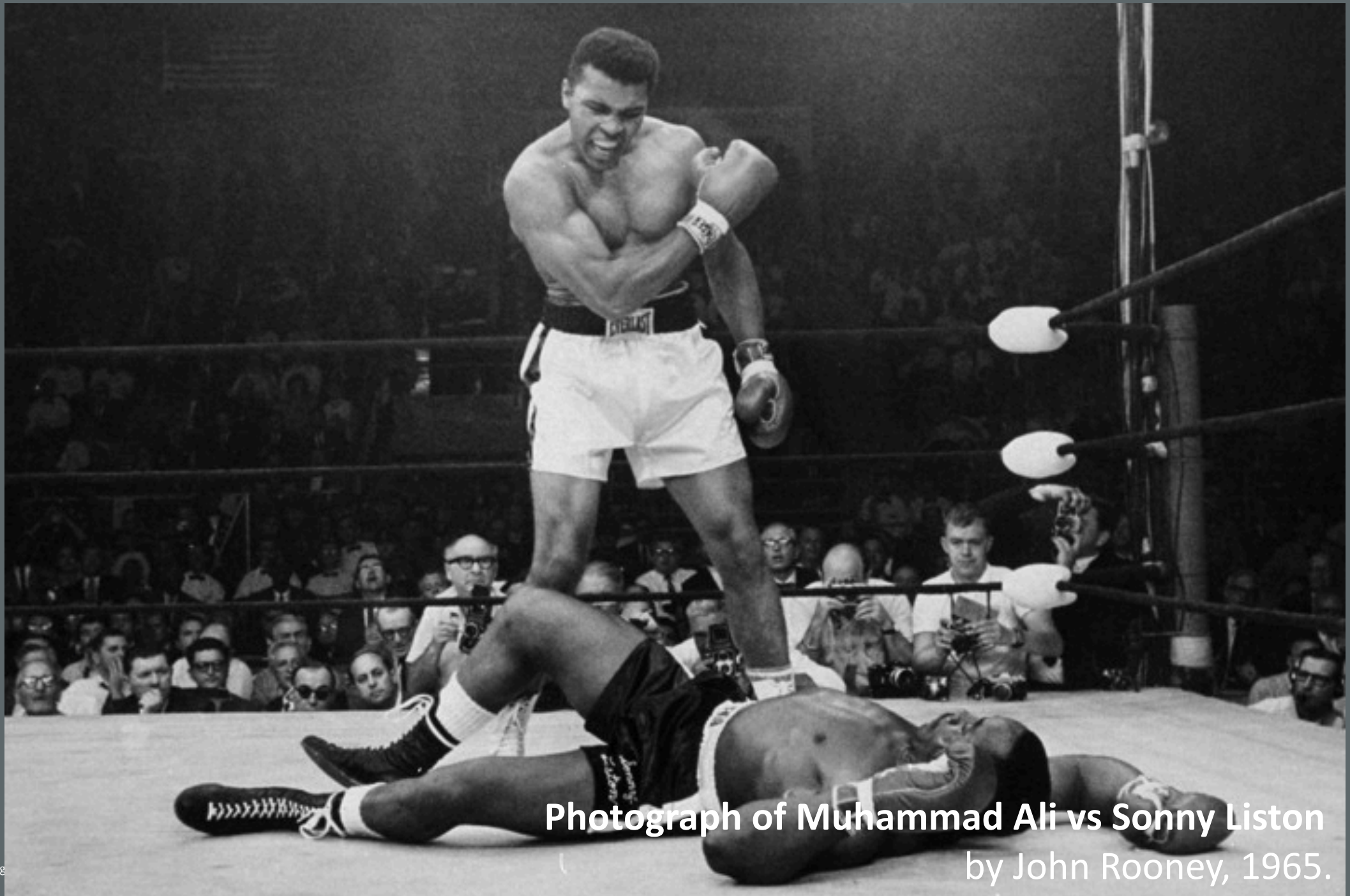
The Tetons and the Snake River
by Ansel Adams, 1942.



The Tetons and the Snake River
by Ansel Adams, 1942.



The Tetons and the Snake River
by Ansel Adams, 1942.



Photograph of Muhammad Ali vs Sonny Liston
by John Rooney, 1965.





Photograph of Muhammad Ali vs Sonny Liston
by John Rooney, 1965.

Recommendations on AI and Public Policy

1) Involve Humans

Review boards for bias in AI systems to prevent perpetuation of harmful stereotypes

2) Pay Attention to Areas Where Laws Already Exist

Employment, credit, housing, criminal justice, health

3) Invest in Education

Creative problem solving, critical thinking, collaboration skills



Adobe