ECSU
ELIZABETH CITY STATE UNIVERSITY

FAYETTEVILLE
STATE UNIVERSITY

An Architectural Model for Web-Based Technologies to Enhance Text-Image Capabilities in Detecting Sex Trafficking Cases

Outline

- Overview
- Team introduction
- Can a machine help the analyst?
- Project purpose
- Objectives
- Work in progress: identifying
  - Characteristics of Victims from Images
  - Keywords & Meaning in Language
  - Cross-modal Analysis
- Progress to Date

Overview

- Granting agency
- CINA located in George Mason University
- DHS CoE
- Two-year project
- Institutions:
  - Elizabeth City State University (ECSU)
  - Fayetteville State University (FSU)
- Consultants
- Potential collaborators

Criminal Investigations and Network Analysis

A DHS CENTER OF EXCELLENCE

Principal Investigators (University)

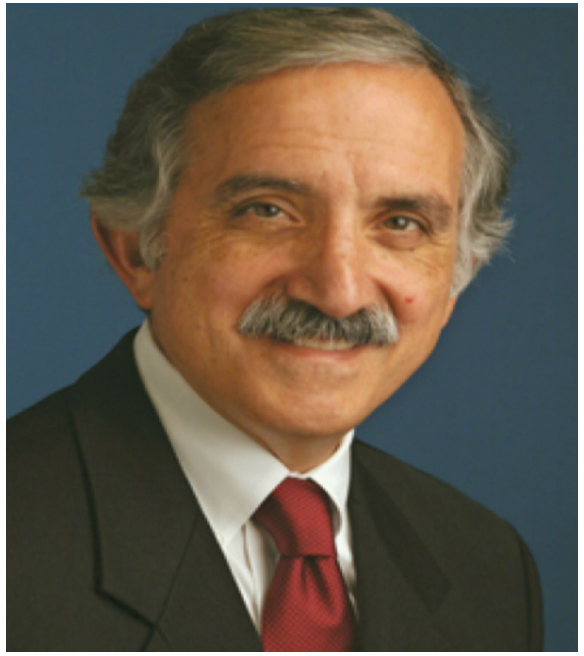
Collaboration between Dr. Das and Dr. Bhattacharya (2 HBCUs):

- UNC UG research grant to develop Data Science/AI courses in Homeland Security
- Unique interdisciplinary courses established at the university

Dr. Shyamal Das, Principal Investigator (PI)
Professor of Homeland Security and Sociology
Elizabeth City State University
Expert in Sex Trafficking Research
Author of many peer reviewed journal articles

Dr. Sambit Bhattacharya, Co-Principal Investigator
Professor of Computer Science
Fayetteville State University
Expert in Artificial Intelligence
Lead PI in grants from NASA, Department of Defense
Many peer reviewed articles, invited speaker at conferences

Industry Consultants



Phil Williams
VP of Corporate Affairs of the Armed Forces Communications and Electronics Association (AFCEA Fort Bragg Chapter)
The Defense Alliance of NC (DANC) Science & Technology Committee

Dr. Bill Rivera
Enterprise Architect and Strategic Designer
Principal at CSS-LUCAS
Worked for DoD on Cloud & Data Analytics
Author: Iranian Strategic Influence, Rowman and Littlefield, 2021
The Strategic Culture of Resistance, JAMS, 2022

Can a machine help the analyst?

- AI = Artificial Intelligence
  - Computer program to produce decisions from data – visual and text
  - Decisions can be hard (one way or another) or have associated probabilities (real world)
- What does a human analyst understand from the advertisement shown here?
- What is happening/happened and to whom – extraction of meaning from language
- What is the visual appearance of the victim and what conclusions can be drawn from it?
- How does visual information help the enrich the meaning in text and vice versa?
- Can a machine do what an analyst cannot?

NEW Upscale Barbie In Town IN & Outcalls - 21

Posted: Thursday, April 28, 2016 11:10 PM

Reply

Hello Gentlemen
My name is [redacted]

Im 100percent real
Come let me pamper you as much as you need or want
Im 5'7 135 pounds of pure pleasure
From the moment we meet you will no im the one you have been For.

Always discreet, clean, and on time. So dont bullshit or lowball
im 420 & party friendly.
NO POLICE/AA/PIMPS

Give me a call or 832 996 [redacted]

Poster's age: 21

- Location: Hillsborough Co, [redacted]
- Post ID: [redacted] tampa

Credits: Alvari, Hamidreza, Paulo Shakarian, and JE Kelly Snyder. "A non-parametric learning approach to identify online human trafficking." *2016 IEEE Conference on Intelligence and Security Informatics (ISI)*. IEEE, 2016.

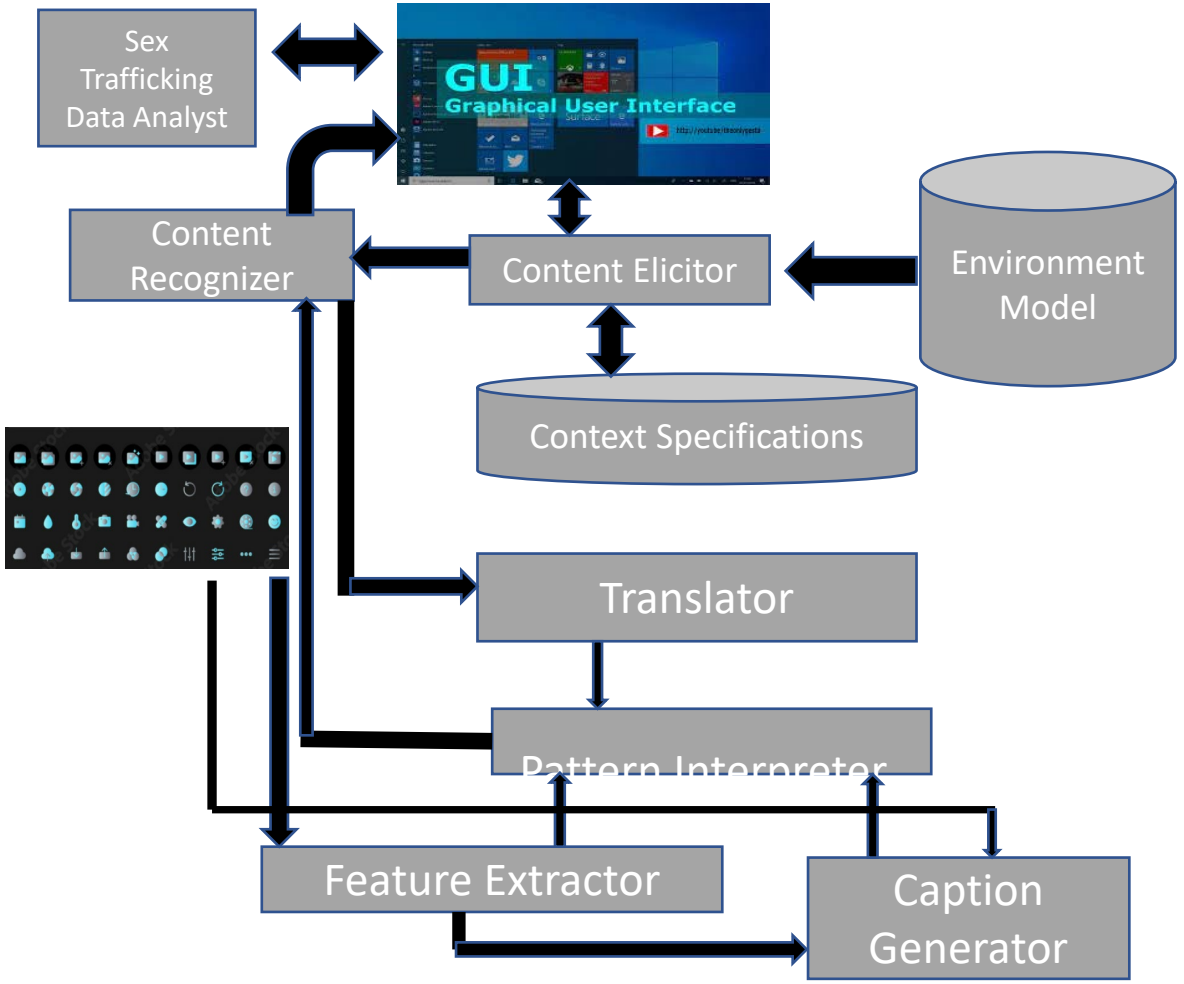
Project Purpose

To assist analysts in detecting sex trafficking through automated data analysis supported by Artificial Intelligence (AI) software.

- Rationale:
  - digital data is very big in size
  - manual analysis is almost impossible
  - AI can perform the analysis automatically on a computer, called data triage
  - high number of false positives (e.g. *flagging an ad as trafficking whereas it is not*), but benefits can outweigh shortcomings
- Final product: project is designed to produce prototypical software and architectural models.
- Future: increased funding to support
  - additional research
  - production of software that is ready to use

Objectives

- Support the sex trafficking data analyst
- AI is tasked to:
  - Understand data based on features which are visual & linguistic where one informs the other
  - Capture only the data that shows criminal activity
  - Be customizable for new contexts



Work in progress: Identifying Characteristics of Victims from Images

- **Predict the age, gender and ethnicity from face images**
- **Increase accuracy of AI by data augmentation with synthetic data**

FairFace Prediction

race: Black
race4: Black
gender: Male
age: 3-9

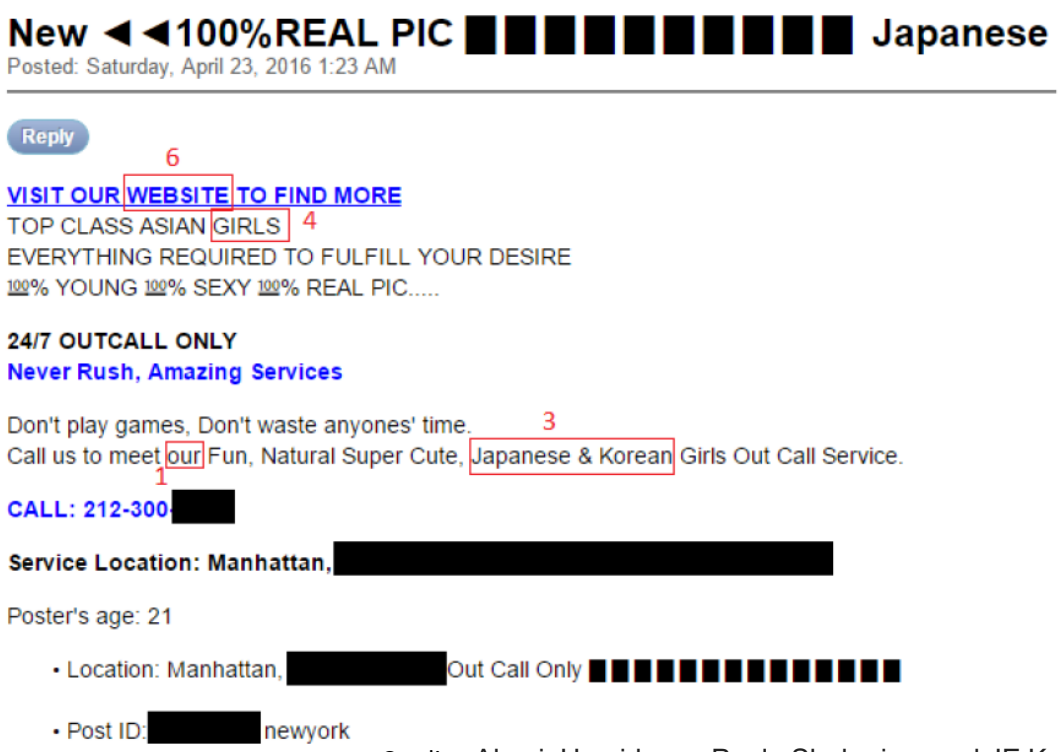
FairFace Prediction

race: Latino_Hispanic
race4: Asian
gender: Female
age: 30-39

Credits:
https://github.com/dchen236/FairFace
https://www.unrealengine.com/en-US/metahuman

Work in progress: Identifying Keywords & Meaning in Language

Fig. 3. An evidence of human trafficking. The boxes and numbers in red, indicate the features and their corresponding group numbers (see also Table I).



- **Advertisement Language Pattern**
- **Words and Phases of Interest**
- **Countries of Interest**
- **Multiple Victims Advertised**
- **Victim Weight**
- **Reference to Website or Spa Massage Therapy**

Credits: Alvari, Hamidreza, Paulo Shakarian, and JE Kelly Snyder. "A non-parametric learning approach to identify online human trafficking." *2016 IEEE Conference on Intelligence and Security Informatics (ISI)*. IEEE, 2016.

Work in progress: Cross-modal Analysis

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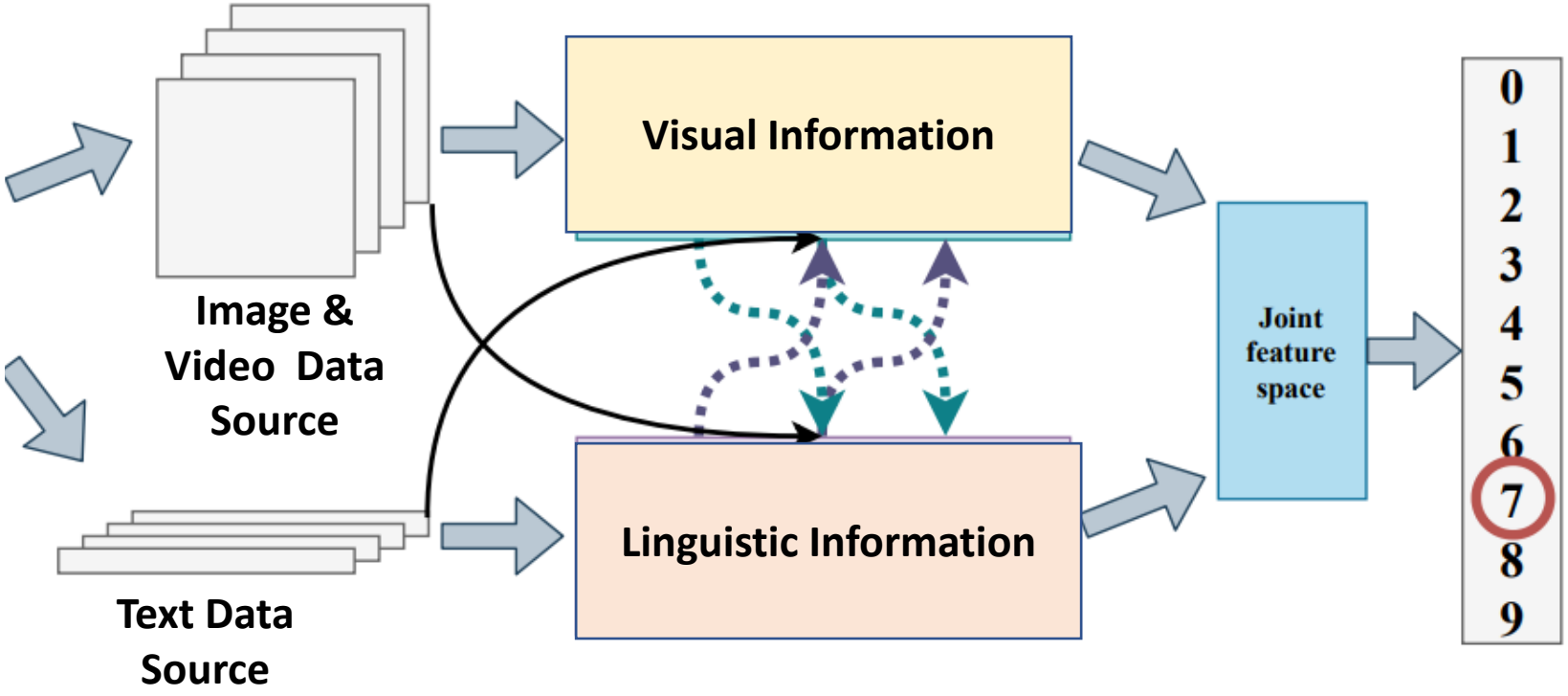

Credits:
https://arxiv.org/pdf/1709.00572.pdf

Progress to Date

- Literature review
- Software architecture of the system - design decisions related to
  - overall system structure
  - behavior
- Software projects started in the Computer Science program at Fayetteville State University under Senior Design
- Meetings and discussions with potential collaborators and organizations that are helping us
  - Thanks to:
    - Dr. Sherrie Caltagirone, Global Emancipation Network (NGO)
    - Dr. Maria Mayorga, Professor, NC State University
    - Dr. Juliana Freire, Professor, New York University

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Thank you!
Questions?