Human Interactions and Financial Investment: A Video-Based Approach

👤 Allen Hu (Yale SOM, allen.hu@yale.edu)
Song Ma (Yale SOM, song.ma@yale.edu)

📱 **Take a picture** to **view** the **paper**

We project **human interactions** in **videos** to **3V** (**visual, vocal, and verbal**) channels via **machine learning** and find the existence of **costly social biases**

RESEARCH QUESTIONS

Human interactions affect almost every aspect in life

Q1: What is the empirical structure of human interactions?

Q2: What features may affect economic decisions?

Q3: Do human interactions generate returns, bring costs, or introduce biases?

RAW DATA

Startup 1-3 min pitch videos

– Scraped from YouTube for 5 accelerators (e.g., Y Combinator, Techstars)

Firm-level information

– From Pitchbook and Crunchbase

– Status, industry, funding, employment

EMPIRICAL DESIGN

Two-Step Approach

1. VC investment decisions on covariates

$$I(invested)=\beta X+\alpha+\epsilon$$

2. Startup outcomes on covariates (conditional on VC invested)

$$outcomes=\beta X+\alpha+\epsilon \quad if \ I(invested)=1$$

VIDEO PROCESSING

Video to vocal

– Speaker diarization (matching voices with faces)

– Vocal emotion recognition

Video to visual
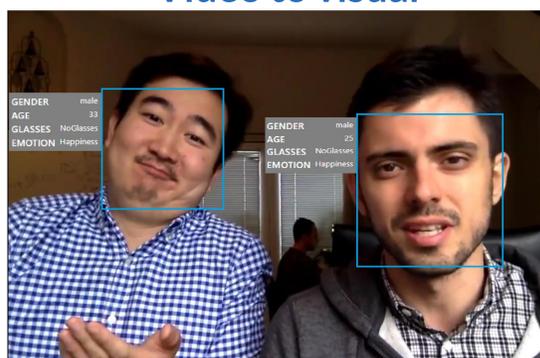
– Extract faces via CV algorithms

– Facial emotion recognition

Video to verbal

– ML: punctuation, speech2text

– Merge with LM finance dictionary

– Merge with NBS social psychology dict

VIDEO AS DATA

– Video data is high-dimensional (~600M dimensions) and unstructured (embedding sound waves and images)

– A flexible and extendable empirical framework with interpretable measures constructed by ML algorithms

– Identify entrepreneurs' genders, ages, emotions, and speech content within word-level time interval (<1 sec)

– Apply different aggregation methods to explore the heterogeneity
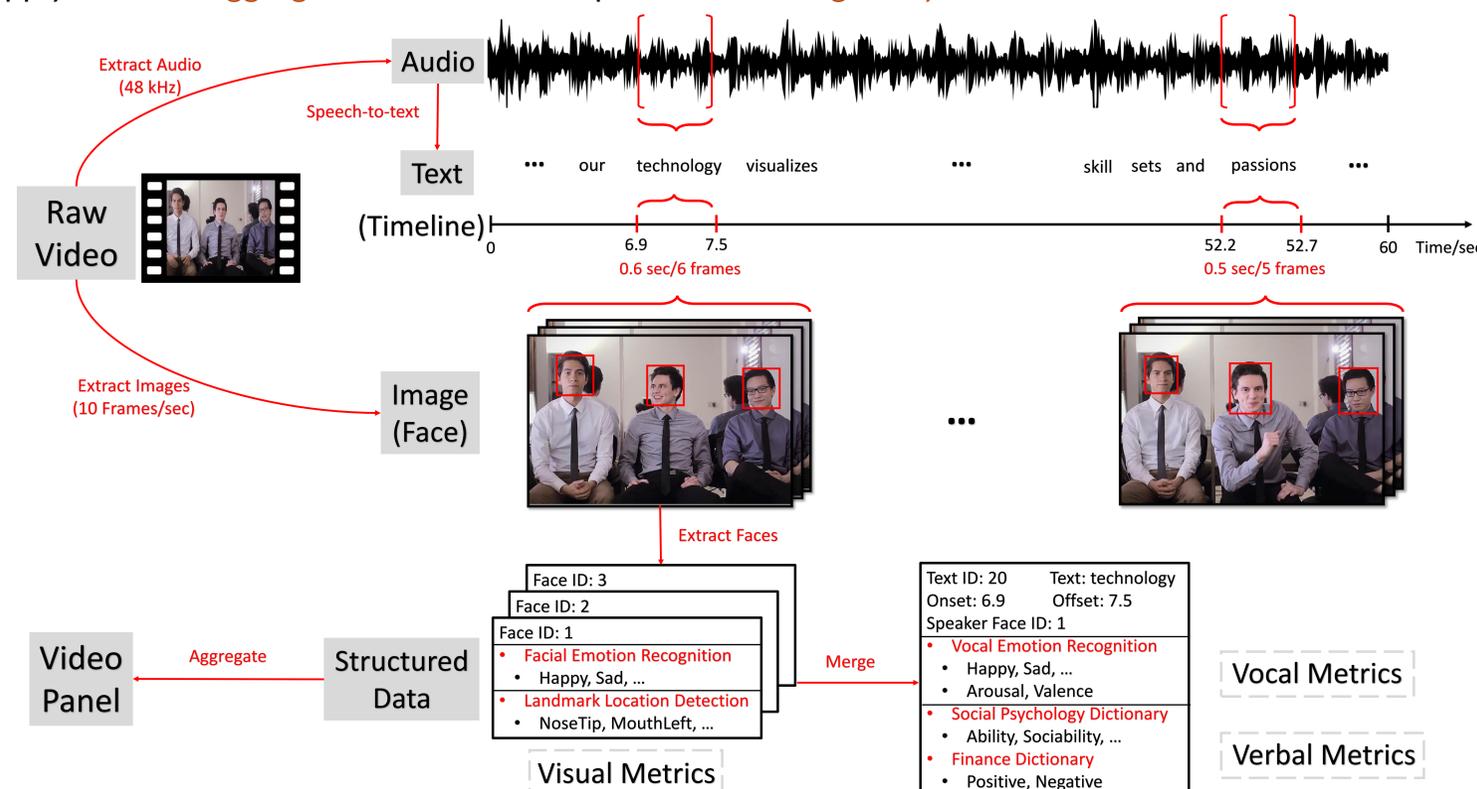
RESULTS

1. VC invests in happy, positive, and passionate teams
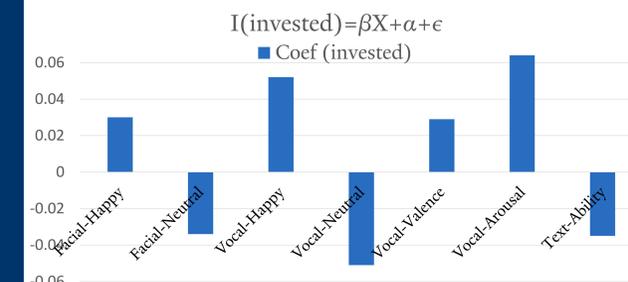
$$I(invested)=\beta X+\alpha+\epsilon$$

2. However, happy teams underperform if conditional on being invested

$$I(invested)=\beta X+\alpha+\epsilon; \ employment=\beta X+\alpha+\epsilon$$
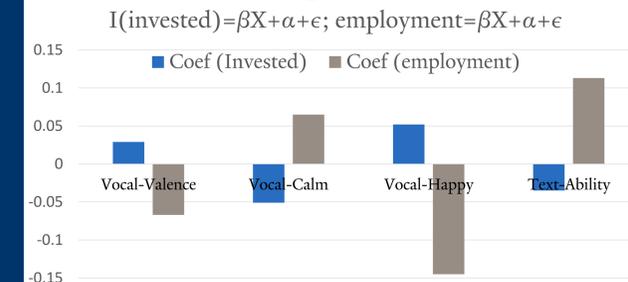
3. Women are often neglected in mixed-gender teams

$$I(invested)=\beta X(men)+\beta X(women)+\alpha+\epsilon$$
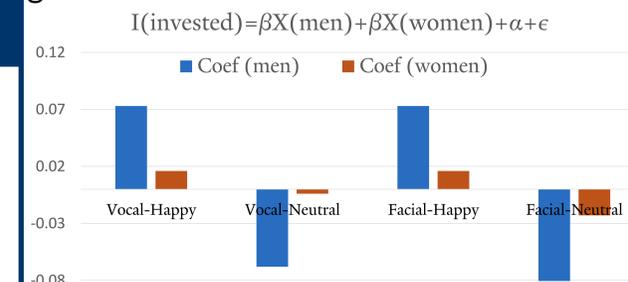
4. Investors do not appreciate passionate/interesting woman in mixed-gender teams

$$I(invested)=\beta X(men)+\beta X(women)+\alpha+\epsilon$$
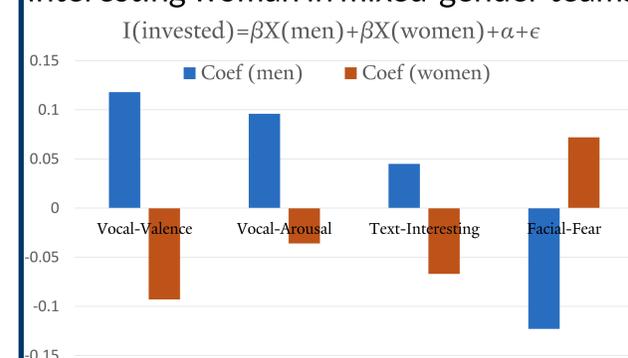
CONCLUSIONS

Human interactions affect economic decisions because...

[❌] **"Know You Better"**

People extract useful information (Is he/she passionate about this project?)

[✔] **"Social Animals"**

People establish social perceptions (Is he/she sociable?/ Do I like him/her?)

Yale University