

# WEN XIE

Houston, TX, USA

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## EDUCATION

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### University of Houston

Ph.D. candidate in Electrical and Computer Engineering, *GPA: 3.85/4.00*

*2018 - present*

Dissertation: Machine Learning and Unstructured Data Analytics for Digital Marketing

Selected courses: Deep Learning, Natural Language Processing, Optimization,

Econometrics, Marketing Models, Financial Mathematics, Digital Image Processing

Advisor: Dr. Zhu Han

### University of Electronic Science and Technology of China

*2014 - 2018*

B.Eng. in Electronic Information Engineering, *GPA: 3.95/4.00*

B.Econ. in Finance, *GPA: 3.95/4.00*

## RESEARCH INTEREST

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**Topic:** Visual Marketing, Online Advertising, Social Media, Consumer Behavior

**Methodology:** Computer Vision, Natural Language Processing, Statistical Modeling, Causal Analysis

## SKILLS

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**Programming:** Python, SQL, Matlab

**Machine Learning:** PyTorch, Keras, TensorFlow, Huggingface

**Data Science:** Numpy, Pandas, Scipy, Matplotlib, StatsModels, PyMC3

## INDUSTRY EXPERIENCE

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**Research intern at Snap Research** - Computational Social Science (CSS) team

*Summer 2022*

- Queried and preprocessed over 50 million users' on-app behavioral data; extracted and cleaned complete sets of covariates pertinent to users, ads, and user-ad engagement contexts and situations.

- Computed propensity scores with logistic regression to account for endogeneity and built weighted linear regression to test the causal effects of two ad-context congruence types on ad viewing time: media content (17 popular categories on social media, e.g., sports and foods.) and format (video and image).

- Found that the congruence increases ad viewing time by 11% and interpreted such effect using priming and processing fluency theory; offered insights for ad/content ranking and recommendation.

- Collaborated with two external teams to acquire data for my research beyond the CSS team, and facilitated collaborations between Snap and UH. This project has a significant impact on ad-driven platforms.

**Machine Learning Research Intern at Apple** - Web Answers and Ranking Team

*Summer 2021*

- Proposed to use text summarization to avoid information loss due to the input truncation of typical Transformer models dealing with long paragraphs and multi-hop question-answering (QA).

- Ranked Wikipedia data for picking important paragraphs with dense passage retrieval (DPR); summarized multiple/long paragraphs using Ctrlsum and Pegasus summarizer based on ROUGE-1/-2/-L metric.

- Built open-domain QA system with DPR, Summarizer (Ctrlsum, Pegasus), and Reader (BART, T5, Ctrlsum); cleaned Hotpot-QA and NQ dataset; implemented benchmarks with the pre-trained models.

- Finetuned generative models (Summarizer and Reader); improved Exact Match by 30% and F1 score by 20%; facilitated QA modeling for production in the industry.

**Other experiences:** Mentored three high school students on object detection projects; named entity recognition with conditional random fields; abusive language classification with LSTM; box-office prediction with textual and visual features using SVM, LightGBM, and hierarchical attention networks.

## WORKING PAPERS

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**Wen Xie**, Mi Hyun Lee, Ming Chen, and Zhu Han. “Understanding Consumers’ Attention on Mobile Advertisements: An Ambulatory Eye-Tracking Study with Machine Learning Techniques,” *Accepted at Journal of Advertising*, Sep 2023 **Won 2021 Amazon Research Award**

- Understanding shoppers’ attention to online ads is crucial for delivering messages effectively.
- Recruited 132 subjects for eye-tracking experiments and collected 235 videos recording shoppers’ viewing trajectory when they book hotels on the Booking.com website or mobile app.
- Trained YOLO v3 object detection model to extract locations of four ad elements: hotel image, price, rating, and text from eye-tracking videos and tested its performance (mAP: 94.50% in PC shopping study and 87.5% in mobile shopping study).
- Proposed hypotheses based on theory of attention, quantified eye-fixation count and duration on each element during the shopping, and built regression models to test our hypotheses.
- Found that (1) textual ad elements both receive more attention than pictorial ones, and such differences are more pronounced in ads on mobile devices than those on PCs; (2) mobile ads receive less attention than PC ads; and (3) online ads receive more attention when consumers are deciding on hotel choices, compared to when they search for hotels earlier in their shopping trajectory.

**Wen Xie**, Gijs Overgoor, Hsin-Hsuan Meg Lee, and Zhu Han. “Not a Black or White Matter: Auto-Detection and Perception of Skin Tone Diversity in Visual Marketing Communication,” *under review in diversity, equity, and inclusion special issue in Marketing Science*, May 2023. Available at: SSRN

- Trained and Tested semantic segmentation model (Swin Transformer) to extract skin pixels from images (mIOU 86%); used K-means with Elbow method to find the dominant skin tone in an image, and quantified the skin tone brightness using the Value channel in HSV color system.
- Theoretically proposed skin-tone diversity dimensions (richness, evenness, brightness) and indices (e.g., Gini index and Shannon index); conducted an online experiment with 402 respondents; discovered that people perceive (1) darker skin-tone representations, (2) the presence of very dark or very light skin tones, (3) larger skin-tone richness and evenness as more diverse from topic analyses via pre-trained sentence transformer, and validated the proposed indices with t-tests.
- Crawled and analyzed over 70,000 images from fashion brands posted on Instagram and Twitter from 2019 to 2021 and found that (1) medium skin tones account for 51.9% of the whole representations on average over the two years, followed by light (30.8%), dark (10.2%), very light (4.8%), and very dark (2.3%) skin tones; and (2) fashion brands significantly featured more darker skin tones from May 2020 in response to the Black-out Tuesday, but (3) they did not significantly improve skin tone richness and evenness until August 2020, discovered by Bayesian change point detection.
- Offered tools for practitioners and researchers: (1) brands gain insights into managing their own and competitors’ diversity, equity, and inclusion (DEI) positions; and (2) researchers have standards to address practical problems at large, e.g., colorism in marketplaces.

**Wen Xie**, Ron Dotsch, Yozen Liu, Maarten Bos, and Zhu Han. “Congruence Affects Social Media Ad Engagement,” *in preparation for submission in Journal of Marketing Research*, Exp. Aug 2023

## WORK IN PROGRESS

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“Advertising with High Quality Image Might Hurt: Insights from Airbnb Demand Analysis Leveraging Image Analytics” - with Sam Hui and Zhu Han.

## PEER-REVIEWED CONFERENCE PROCEEDINGS

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**Wen Xie**, Ron Dotsch, Maarten Bos, and Yozen Liu. 2023. "Improving Social Media Video Advertising Acceptance Using Priming: Evidence from Big Data Analysis." *In Proceedings of 2023 Academy of Marketing Science (AMS) Annual Conference, New Orleans, LA*

- **Best Conference Paper** M. Wayne Delozier Award

**Wen Xie**, Gijs Overgoor, Hsin-Hsuan Meg Lee, and Zhu Han. 2023. "Automated Detection of Skin Tone Diversity in Visual Marketing Communication." *In Proceedings of 2023 Hawaii international Conference on System Science (HICSS), Maui, Hawaii*

**Wen Xie**, Ming Chen, and Zhu Han. 2020. "How to Enhance Online Hotel Ad Effectiveness Based on Real-World Data: Mobile Eye-Tracking and Machine Learning Tell." *In Proceedings of 2020 American Marketing Association (AMA) Winter Academic Conference, San Diego, California*

- **Best Paper Award** in Market Research

## CONFERENCE PRESENTATIONS

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**2023:** Hawaii International Conference on System Sciences, Maui, Hawaii; Marketing Science Diversity, Equity, and Inclusion (DEI) Conference, Dallas, TX; AMS Annual Conference, New Orleans, LA

**2021:** Annual ISMS Marketing Science Conference, Virtual

**2020:** AMA Winter Academic Conference, San Diego, CA

## HONORS and AWARDS

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M. Wayne Delozier Award Best Conference Paper at 2023 AMS Annual Conference

Cullen Graduate Student Success Fellowship (UH)

Best Paper Award in Market Research at 2020 AMA Winter Academic Conference

Excellent Student Leader Scholarship (UESTC)

WAC Scholarship (WAC Lighting CO.)

Grade A Certificate of Comprehensive Quality of Undergraduates (Sichuan Provincial Committee of the Communist Youth League of China)

National Encouragement Scholarship (UESTC)

The Provincial First Prize in China Undergraduate Mathematical Contest (Popularization Committee of the Chinese Mathematical Society)

## REFERENCES

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### **Zhu Han**

John and Rebecca Moores Professor  
Electrical and Computer Engineering  
and Computer Science Department  
University of Houston  
Email: zhan2@uh.edu

### **Maarten Bos**

Lead Research Scientist, Manager  
Snap Research  
Snap Inc.  
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