Zachary Trefler

VoiceShield: Teaching Computers to Distinguish Real Data From Fake

Challenge: Information
Category: Senior
Region: Waterloo-Wellington
City: Waterloo, ON
School: Waterloo Collegiate Institute

Abstract: Voice recognition systems powered by machine learning are widely used to secure critical data, e.g. on smartphones and in banking systems. But can they be fooled? My research reveals a critical vulnerability: adversarial machine learning techniques can generate convincing faked audio prints. I then introduce a novel method for voice recognition systems to flag fake data, thus reducing this risk.

Biography

Hi, my name is Zachary Trefler. I am 17 years old, in grade 12 at Waterloo C.I. in southern Ontario. I am mainly interested in physics and computer science, but all sciences fascinate me (University has meant tough decisions). Besides science, I am reading books constantly, as well as running, wood-carving and kite-flying. I also talk to people sometimes. My project, WaveFire, was my attempt to improve voice recognition, or more accurately, speaker verification (SV). I've shown that many machine learning algorithms used for SV are vulnerable to fake data. By giving an SV algorithm training experience with intentionally fake data using the WaveFire model, the algorithm grows much more robust. I am continuing to improve WaveFire, making it increasingly generalizable and user-friendly. To other students doing science fair projects, I would advise you to simply try to learn more about whatever you are curious about. The questions will flow naturally, and eventually, answers will follow. Work hard, work smart, and don't stop!

Awards	Value
Canadian Acoustical Association Award - Senior Sponsor: Canadian Acoustical Association	$1 000
Excellence Award - Senior - Bronze Medal Sponsor: Youth Science Canada	
Challenge Award - Information - Senior Sponsor: Youth Science Canada	
Carleton University Entrance Award Senior Bronze Medallist - $1,000 Entrance Award Sponsor: Carleton University	$1 000
University of Ottawa Entrance Scholarship Senior Bronze Medallist - $1000 Entrance Scholarship Sponsor: University of Ottawa	$1 000
Western University Scholarship Bronze Medallist - $1000 Entrance Scholarship Sponsor: Western University	$1 000
Total	$4 000