Humanising Data
Improving business and maybe even the world

Phil Harvey
Senior Cloud Solution Architect for Data & AI
One Commercial Partner, Microsoft UK
Why is this important?
Data gives us new ways of knowing and new things to know.

Data makes **software smarter** through AI. It is how machines know.
Detecting Illegal Small Scale Mines in Ghana using Deep Learning

Olivia Klose

Short thesis
Computer vision is becoming one of the focus areas in artificial intelligence (AI) to enable computers to see and perceive like humans.

Impact on ecology
Impact on society
Impact on environment
Breaking Bard
Small data for insight
"Our goal is to **democratise AI** to empower every person and every organisation to achieve more.

- "The **core currency** of any business going forward will be the ability to convert their **data into AI** that drives competitive advantage"

- "Every developer can be an AI developer, and every company can become an AI company"
### Sophisticated pretrained models
To simplify solution development

### Popular frameworks
To build advanced deep learning solutions
- TensorFlow
- Keras
- Pytorch
- Onnx

### Productive services
To empower data science and development teams
- Azure Databricks
- Azure Machine Learning
- Machine Learning VMs

### Powerful infrastructure
To accelerate deep learning
- CPU
- GPU
- FPGA

### Flexible deployment
To deploy and manage models on intelligent cloud and edge
- On-premises
- Cloud
- Edge
<table>
<thead>
<tr>
<th>COGNITIVE SERVICES</th>
<th>Vision</th>
<th>Speech</th>
<th>Language</th>
<th>Search</th>
<th>Decision</th>
<th>Labs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Computer Vision</td>
<td>Speech Service</td>
<td>Bing Spell Checker</td>
<td>Bing Autosuggest</td>
<td>Content Moderator</td>
<td>Gesture</td>
</tr>
<tr>
<td></td>
<td>Face</td>
<td>Speaker Recognition</td>
<td>Text Analytics</td>
<td>Bing Image Search</td>
<td>Personaliser</td>
<td>Event Tracking</td>
</tr>
<tr>
<td></td>
<td>Video Indexer</td>
<td>Translator Speech</td>
<td>Translator Text</td>
<td>Bing News Search</td>
<td>Anomaly Detector</td>
<td>Answer Search</td>
</tr>
<tr>
<td></td>
<td>Ink Recogniser</td>
<td>Speech to Text, Text to Speech</td>
<td>QnA Maker</td>
<td>Bing Video Search</td>
<td>Local Insights</td>
<td>Conversation Learner</td>
</tr>
<tr>
<td></td>
<td>Form Recogniser</td>
<td>Immersive Reader (SDK)</td>
<td>Bing Web Search</td>
<td>Bing Web Search</td>
<td>Entity Linking</td>
<td>URL Preview</td>
</tr>
<tr>
<td></td>
<td>Custom Vision Service</td>
<td></td>
<td>Bing Entity Search</td>
<td>Bing Visual Search</td>
<td>URL Personality Chat</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Custom Speech Service</td>
<td></td>
<td>Bing Local Business Search</td>
<td>Bing Visual Search</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Language Understanding</td>
<td></td>
<td>Bing Custom Search</td>
<td>Bing Visual Search</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bing Custom Search</td>
<td></td>
<td></td>
<td>Bing Visual Search</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Microsoft
Those hours, that with gentle work did frame
The lovely gaze where every eye doth dwell.
Will play the tyrants to the very same
And that unfair which fairly doth excel;
For never-resting time leads summer on
To hideous winter, and confounds him there;
Sap checked with frost, and lusty leaves quite gone,
Beauty o'er-snowed and bareness every where:
Then were not summer's distillation left,
A liquid prisoner pent in walls of glass,
Beauty's effect with beauty were bereft,
Nor it, nor no remembrance what it was:
But flowers distilled, though they with winter meet,
Leese but their show; their substance still lives sweet.

https://azure.microsoft.com/en-us/services/cognitive-services/text-analytics/
“What happens if you analyse the works of Shakespeare with a modern text analytics API?”

available as a 5mb text file

https://azurecitadel.github.io/videos/datalakeanalytics-cogser
Romeo and Juliet

Spoiler warning. If you haven’t seen it, this gives away the ending.
Macbeth

Spoiler warning. If you haven’t seen it, this gives away the ending.
Use new tools to learn new things from data you have.
• “Our goal is to democratise AI to empower every person and every organisation to achieve more.

• “The **core currency** of any business going forward will be the ability to convert their **data into AI** that drives competitive advantage”

• “Every developer can be an AI developer, and every company can become an AI company”
Should you use everything you possibly could?
Practical Ethics
Principled Consideration
AI PRINCIPLES

- Fairness
- Reliability & Safety
- Privacy & Security
- Transparency
- Accountability

Download: http://aka.ms/futurecomputed
1. FAIRNESS
AI systems should treat all people fairly

Bias can make AI unfair in the first place!

EXAMPLES...
• RACIAL BIAS
• GENDER BIAS
• SOCIOECONOMIC BIAS

... THERE ARE MANY MORE
2. SAFETY & RELIABILITY
AI systems should perform safely and reliably

Computers are amazing. They can get it wrong.

A FOCUS ON...
• AUTOMATION BIAS
2. SAFETY & RELIABILITY
AI systems should perform **safely** and **reliably**

Computers are amazing. They **can** get it wrong.

A FOCUS ON...
- **AUTOMATION** BIAS

RELIABILITY...
- **CONTEXT** IS KEY
PRINCIPLED CONSIDERATION

3. PRIVACY & SECURITY

AI systems should be secure and respect privacy

New PII and new attack vectors.

EXAMPLES...

• NOTICE & CONSENT

EXAMPLES...

• ATTACK VECTORS

Explaining and Harnessing Adversarial Examples
Goodfellow, Shlens, Szgedy
Bakunov/Yandex
Accessorize to a Crime: Real and Stealthy Attacks
on State-of-the-Art Face Recognition
Sharif, Bhagavatula, Reiter, Bauer
Experimental Security Research of Tesla Autopilot
Tencent Keen Security Lab
4. INCLUSIVENESS
AI systems should empower everyone and engage people

Unconscious human bias can be built into the process

EXAMPLES...
• TEST CASES

Until 2011 female body type testing wasn’t mandatory.

47% more likely to be injured in a crash.
Over 1 billion people with disabilities.
It was an amazing experience to hand me back the controller I never thought I’d ever hold again. The whole gaming industry needs to take a lesson and understand that a large minority of gamers have a disability.

Vivek Gohil
Gamer
5. TRANSPARENCY
AI systems should be explainable.

Transparency and accuracy have an inverse relationship.

ALGORITHMS

WHY?
- MORE DATA BOILED DOWN INTO MORE COMPLEX MATHS.

EXAMPLE...
- ASTHMA VS. PNEUMONIA

Rule based learning.
Not as accurate as DNNs but more intelligible.
Produced the rule

HasAsthama(x) ⇒ LowerRisk(x)

Why?
AI systems should have algorithmic accountability

In balance to transparency

WHO TAKES IT...

• RESPONSIBILITY VS. BLAME
• BE CAREFUL WHAT YOU CLAIM
• BE CLEAR ON ACCOUNTABILITY.
• MANY LESSONS
Understanding the scenario

Handling and understanding data

Developing Models

NOW WHAT?

http://aischool.microsoft.com

https://aka.ms/FacialRecognitionPrinciples

GDPR as opportunity

Data Governance & Trust

Data Science before ML

Recent headline “Complex and expensive methods often outperformed by simple heuristics”

Explain-ability over accuracy
NEW RESEARCH

- Bias detection tools
- Bias mitigation techniques
- Societal impact
- Interdisciplinary research

NEW RULES

- Facial recognition regulation
- Lawful use of surveillance
- Notice and consent
- Privacy
Ethical AI

Bringing it all together

The Seeing AI App

Computer Vision, Image, Speech Recognition, NLP, and ML from Microsoft Cognitive Services
“Our goal is to democratise AI to empower every person and every organisation to achieve more.

“The core currency of any business going forward will be the ability to convert their data into AI that drives competitive advantage”

“Every developer can be an AI developer, and every company can become an AI company”
Next wave skills
In data and artificial intelligence
AI Engineering

ML Ops & DataOps

Cloud & Solutions Architecture
Bias Detection and Handling & model transparency including model selection

Societal Impact Assessment & Environmental including triple bottom line

Data Driven Decision Making & Story telling including ethical clarity
Lifelong learning
AI Collaboration
Non-Deterministic Software
Empathy & Awareness
Digital Sociology
Empathy

Requires you to understand more to be successful

Enables you to understand more to be successful

Diversity

Different Backgrounds
Different Skills
Different Perspectives

DIVERSITY

Implementing Grutter’s Diversity Rationale: Diversity and Empathy in Leadership

REBECCA K. LEE

ABSTRACT

This Article examines the role of leadership in implementing the diversity rationale affirmed by the U.S. Supreme Court in Grutter v. Bollinger and argues that greater diversity and empathy are needed for effective leadership in diverse settings. In Grutter, the Court held that the University of Michigan Law School’s use of race in selecting students for admission did not violate the Constitution’s Equal Protection Clause. In so doing, the Court affirmed Justice Powell’s diversity rationale, as expressed in an earlier case, Regents of University of California v. Bakke, in which he noted that “the nation’s future depends upon leaders trained through ‘wide exposure’ to the ideas and mores of students as diverse as this Nation of many peoples.” By endorsing this diversity justification, the Court today acknowledged the interdependent relationship between diversity and leadership. The Court, however, did not describe the specific skills needed to lead in diverse environments and how such skills may be developed at school and afterward in the workplace. A number of businesses and other actors, including noted justice Powell’s reasoning in their amicus briefs in Grutter, largely supporting the law School, but these amici also neglected discuss the process by which leadership skills would be acquired and implemented in settings comprised of different groups of people. This Article aims to fill in the missing piece of the discussion and emphasize the importance of diverse and empathetic leadership in supporting diversity efforts. If, as Grutter affirms, we want to build a nation with leaders broadly exposed to ideas as diverse as our nation’s population, then we must tailor the purpose and practice of leadership toward the realization of this goal.

I. INTRODUCTION

The United States Supreme Court has recognized that our country’s leaders
Human skills are the *most important* skills in data.
make data empower everyone