

WE ARE AI
#1

WHAT IS AI?



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Cite as:

Julia Stoyanovich and Falaah Arif Khan. “What is AI?”. *We are AI Comics*, Vol 1 (2021) https://dataresponsibly.github.io/we-are-ai/comics/vol1_en.pdf

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ARTIFICIAL INTELLIGENCE (AI) IS GREAT!

THE CONVERGENCE OF UNPRECEDENTED DATA COLLECTION CAPABILITIES,

AND ENORMOUS COMPUTATIONAL POWER,

...AND THE APPETITE TO USE THEM TO MOVE SOCIETY FORWARD, IS TRULY MAGICAL!

THE POTENTIAL FOR GOOD SEEMS LIMITLESS –

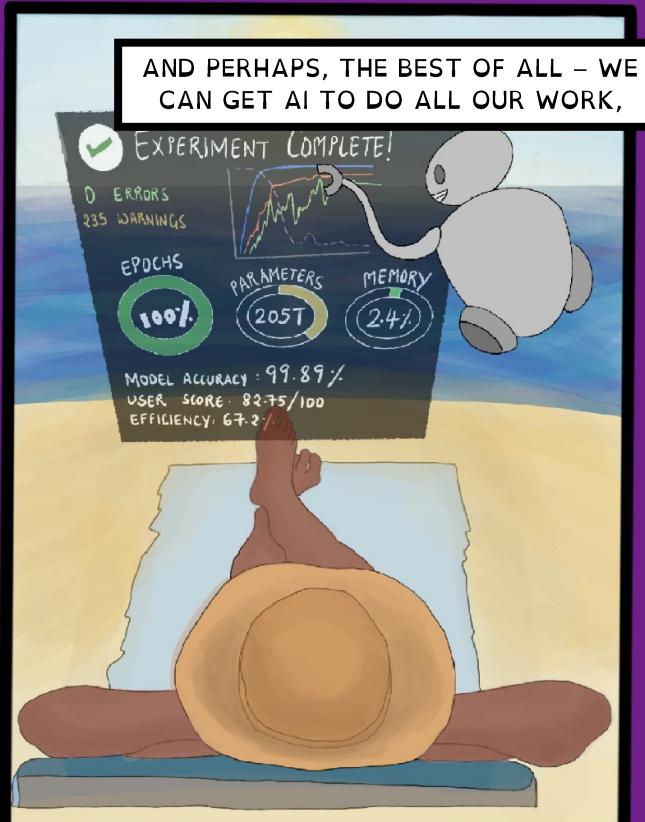
WE CAN ACCELERATE SCIENTIFIC DISCOVERY,

FROM MEDICINE TO ASTROPHYSICS AND BACK

WE CAN IMPROVE SOCIETY BY IMPROVING HOW GOVERNMENTS FUNCTION - MAKING THEIR OPERATIONS MORE TRANSPARENT AND ACCOUNTABLE, AND THEIR RESOURCE DISTRIBUTION DECISIONS MORE EQUITABLE.

AND PERHAPS, THE BEST OF ALL – WE CAN GET AI TO DO ALL OUR WORK,

WE CAN BOOST INNOVATION –



BUT BEFORE WE REJOICE AT THE POSSIBILITIES,
LET'S STEP BACK AND UNPACK THAT TERM, AI.

HERE'S A THROWBACK TO THE
PREHISTORIC DAYS OF EARLY 2020.

REMEMBER THE HOBBY THAT MANY
OF US ATTEMPTED TO MASTER
- WITH MIXED RESULTS -
DURING THE PANDEMIC LOCKDOWN:
BAKING!



WE WILL USE BAKING TO EXPLAIN THREE COMPONENTS OF AI:
ALGORITHMS, DATA, AND DECISIONS.

CONSIDER THIS 'ALGORITHM':

1. PREP - BUY INGREDIENTS, MEASURE THEM

2. MIX - COMBINE YEAST, FLOUR AND WATER

3. COVER - WAIT FOR THE DOUGH TO RISE

4. KNEAD - SHAPE WAIT SOME MORE, REPEAT

5. FINALLY, BAKE.

THE RECIPE IS THE ALGORITHM:
IT LISTS THE STEPS WE TAKE TO TRANSFORM
THE INGREDIENTS INTO A LOAF OF BREAD.

AKIN TO HOW WE EACH HAVE OUR OWN COOKING STYLES;
ALGORITHMS ARE OF DIFFERENT TYPES...

THE ALGORITHM MAY BE FULLY PRESCRIBED:

IT MAY LIST EXACTLY WHAT INGREDIENTS TO GET,

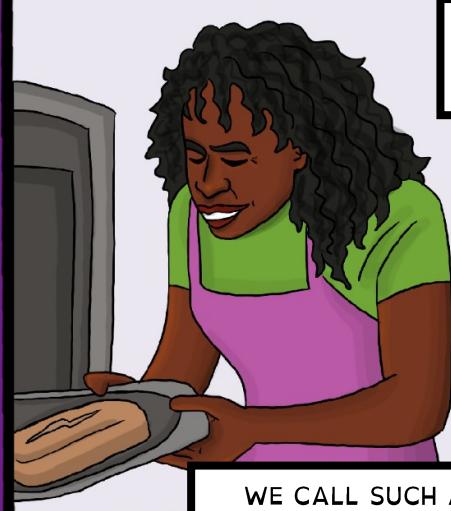


EXACTLY HOW MUCH OF EACH INGREDIENT TO TAKE,

IN WHAT ORDER TO COMBINE THEM,



HOW LONG TO WAIT,



AND AT WHAT TEMPERATURE TO BAKE.

WE CALL SUCH ALGORITHMS
"RULE-BASED".

IF WE KNOW THE RULES WELL ENOUGH TO WRITE THEM DOWN,

AND IF WE CAN ALWAYS GET EXACTLY THE SAME INGREDIENTS,

...THEN WE WILL BAKE A GREAT LOAF OF SOURDOUGH EVERY TIME!

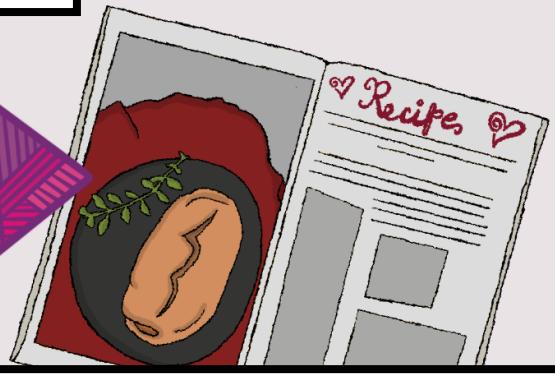
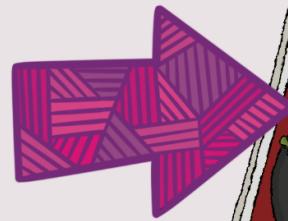


BUT WE MAY NOT ALWAYS BE SO LUCKY...

WE MAY ONLY HAVE EVER EATEN DELICIOUS SOURDOUGH, BUT MAY NOT KNOW THE RULES FOR MAKING A GOOD LOAF OURSELVES.

SO, INSTEAD OF RELYING ON OUR OWN EVERYDAY EXPERIENCE TO DESIGN RULES, WE CAN HAVE THE ALGORITHM LEARN THESE RULES FROM DATA.

WE CALL SUCH ALGORITHMS “DATA-DRIVEN”



THEY LEARN THE RECIPE TO BAKE SOURDOUGH FROM OUR EXPERIENCE OF WHAT GOOD SOURDOUGH TASTES LIKE.

HOW DOES THIS WORK?

WE HAVE SOME VAGUE IDEA OF WHAT INGREDIENTS GO INTO A LOAF,



AND HAVE SEVERAL DATA POINTS OF EXPERIENCE OF WHAT IT'S SUPPOSED TO TASTE LIKE,



AND SO WE GO ABOUT TRYING DIFFERENT COMBINATIONS OF THE INGREDIENTS AND COOKING TECHNIQUES.

EACH TIME WE MAKE A LOAF WE ASK OURSELVES – DO WE LIKE HOW THE SOURDOUGH CAME OUT?



IF SO, WE MAY KEEP THIS RECIPE, OR MAYBE WE’LL TRY SOMETHING SLIGHTLY DIFFERENT.

OR A LOT DIFFERENT, AND SEE WHICH RESULT WE LIKE BETTER.

FROM THIS WE CAN FIGURE OUT WHICH CULINARY SORCERY PRODUCES THE YUMMIEST RESULTS

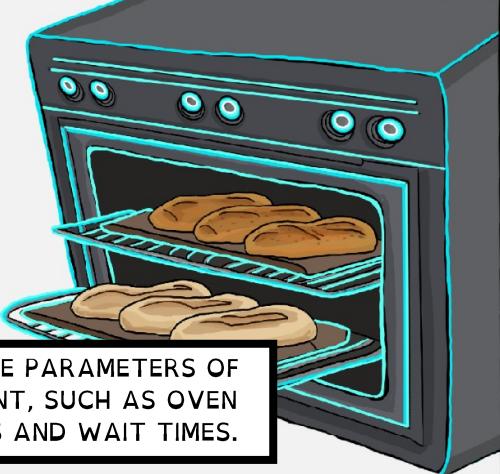
– CLOSEST TO WHAT WE REMEMBER A GOOD LOAF TASTES LIKE.



WE DISCUSSED THE ALGORITHMS, NOW WHAT ABOUT THE **DATA**?

IT COMES IN MULTIPLE FORMS.

ONE FORM IS: THE PROPORTION OF INGREDIENTS THAT WE TAKE AS INPUT.

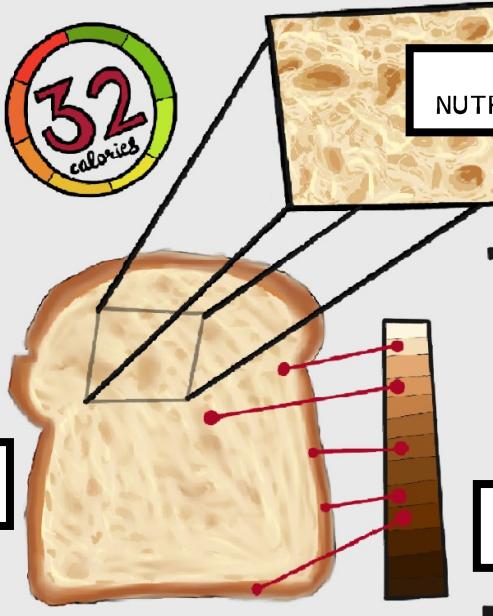


ANOTHER IS THE PARAMETERS OF YOUR EQUIPMENT, SUCH AS OVEN TEMPERATURES AND WAIT TIMES.



AND THEN THERE IS DATA THAT DESCRIBES THE **OUTPUT** –

THAT SCRUMPTIOUS SOURDOUGH THAT WE REMEMBER DEMOLISHING AND ARE HOPING TO BAKE OURSELVES!



THESE ARE ALL 'OBJECTIVELY' MEASURABLE FACTORS.

THEN THERE'S DATA IN THE FORM OF HUMAN JUDGEMENT -

DID THE LOAF COME OUT WELL OR NOT?

DOES IT LOOK GOOD?

IS IT TASTY?



THIS IS THE 'SUBJECTIVE' FEEDBACK WE GET ABOUT THE OUTPUT.

AND MORE OFTEN THAN NOT, IT'S MORE IMPORTANT THAN THE NUMERICALLY-QUANTIFIABLE PROPERTIES OF THE OUTPUT.

NOW, WHAT ABOUT DECISIONS?

AFTER EVERY RUN OF OUR BAKING ALGORITHM,
A HUMAN IS MAKING A DECISION -



ARE WE GIVING IT A THUMBS-
UP OR A THUMBS-DOWN?

DOES THE DOUGH LOOK GOOD
ENOUGH TO PUT INTO THE OVEN?

HAS IT RISEN ENOUGH
AND SHALL WE TAKE
IT OUT OF THE OVEN?

IS THE RESULT
INSTAGRAM-WORTHY?

A CONSEQUENTIAL DECISION IS - NOW THAT WE'VE TRIED A
BUNCH OF RECIPES, WHICH WILL WE CONSIDER A SUCCESS?

IS IT MORE IMPORTANT TO
HAVE AN APPETIZING-
LOOKING LOAF,

DO WE THINK THAT WE'VE TRIED OUT ENOUGH RECIPES
TO PASS OUR EXPERIENCE ON TO A MACHINE,

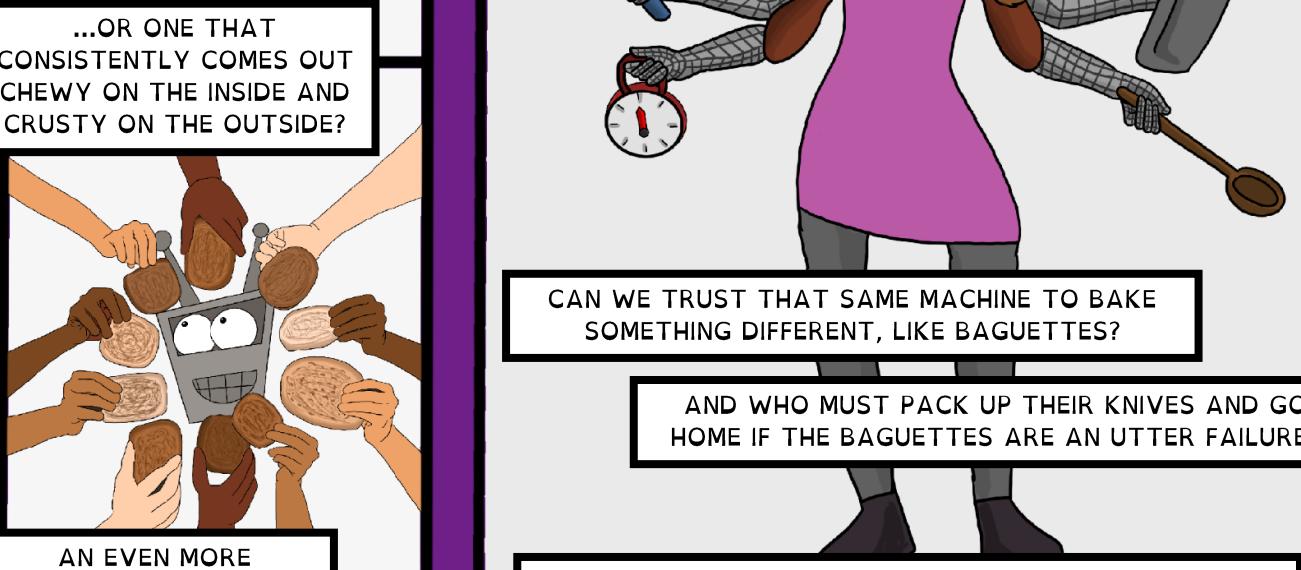
AND TRUST IT TO BAKE - AND MAKE
JUDGEMENTS - ON OUR BEHALF?



...OR ONE THAT
CONSISTENTLY COMES OUT
CHEWY ON THE INSIDE AND
CRUSTY ON THE OUTSIDE?



AN EVEN MORE
IMPORTANT DECISION IS:



CAN WE TRUST THAT SAME MACHINE TO BAKE
SOMETHING DIFFERENT, LIKE BAGUETTES?

AND WHO MUST PACK UP THEIR KNIVES AND GO
HOME IF THE BAGUETTES ARE AN UTTER FAILURE?

SEVERAL MORAL QUESTIONS AROUND AGENCY,
AUTONOMY AND RESPONSIBILITY NATURALLY EMERGE!

CIRCLING BACK NOW – SO WHAT IS AI?

AI CAN BE CHARACTERIZED AS A SYSTEM IN WHICH ALGORITHMS USE DATA TO MAKE DECISIONS - ON OUR BEHALF OR TO HELP US (HUMANS) MAKE DECISIONS.

AN EXAMPLE OF AI IS ROOMBA – THE ROBOT THAT HELPS US CLEAN.

ROOMBA IS GREAT AT AUTONOMOUSLY VACUUMING THE FLOOR,

AND IS ONE OF THE VICTORIES OF CLASSICAL — RULE-BASED — AI.

IT'S THE STUFF OF TEXTBOOKS.

THE DECISIONS A ROOMBA MAKES ARE —

HOW SHOULD IT MAP OUT A ROOM (THAT IT MAY HAVE NEVER SEEN BEFORE) ?

WHAT'S AN EFFICIENT STRATEGY TO CLEAN?

AND WHAT IS ITS NEXT MOVE: GO LEFT, GO RIGHT OR TURN AROUND.

ANOTHER EXAMPLE OF HIGHLY SUCCESSFUL AI IS IBM'S DEEP BLUE THAT BEAT GARRY KASPAROV, THE LEGENDARY GRANDMASTER, AT CHESS IN 1997.

THIS SUCCESS IN GAMES, AND AT LEARNING FROM SELF-PLAY, IS ONE OF THE HOLY GRAILS OF AI.

THE DECISIONS IN CHESS ARE MORE COMPLEX THAN IN ROOMBA,

BUT THEY ARE SIMILAR IN THAT THEY ARE STRATEGIC:

WHAT'S THE BEST NEXT MOVE?

WHAT'S A GOOD OVERALL STRATEGY TO TAKE?

AND HOW MUST WE EFFECTIVELY RESPOND TO THE DECISIONS OF THE OPPONENT?

BUT NOW CONSIDER ANOTHER INCREASINGLY POPULAR APPLICATION OF AI:

ITS USE IN HIRING.

THE DECISIONS THAT WE ARE ASKING AN AI TO MAKE HERE ARE VERY DIFFERENT FROM THOSE MADE BY ROOMBA AND BY DEEP BLUE.

WE ARE ASKING IT TO PREDICT WHO WILL DO WELL ON THE JOB AND WHO WILL FAIL.

THE BIG QUESTION IS:

CAN AN AI SUCCEED AT TASKS – LIKE HIRING – THAT AMOUNT TO PREDICTING SOCIAL OUTCOMES?

HOW DO WE MEASURE SUCCESS?

CAN WE KNOW WHETHER WE DID HIRE THE BEST CANDIDATES?

AND DO WE WANT AN AI TO BE MAKING SUCH PREDICTIONS IN THE FIRST PLACE?

DO WE CONSIDER THIS TO BE ETHICAL?

EVEN WITH ALL OF OUR INTUITION, WE HUMANS ARE NOTORIOUSLY BAD AT MAKING BIG DECISIONS.

WHY WOULD WE EXPECT AN ALGORITHM TO BE ABLE TO TAKE A WHIFF OF OUR PAST AND BE ABLE TO PREDICT THE FUTURE?

THERE IS NO SECRET SAUCE OR MAGIC BEANS THAT INNATELY MAKES AI MORE ‘ACCURATE’ OR ‘EQUITABLE’ OR ‘FAIR’ THAN ITS HUMAN PREDECESSORS.

AS OUR FRIENDS SERGE ABITEBOUL AND GILLES DOWEK SAY [1] –

CREATIONS OF THE HUMAN SPIRIT, ALGORITHMS ARE WHAT WE MAKE THEM!

AND THEY WILL BE WHAT WE WANT THEM TO BE: IT’S UP TO US TO CHOOSE THE WORLD WE WANT TO LIVE IN.

FIN.