
CS 232:
Artificial Intelligence

Fall 2023

Prof. Carolyn Anderson
Wellesley College

Workforce Automation

50% of professions automated

Switchboard operators: **Actual date:** 1960

Travel agents: **Actual date:** 2014

Truck drivers: **Expert guess:** 2026

Lawyers:

Surgeons: **Expert guess:** 2053

Retail sales jobs: **Expert guess:** 2031

Teachers:

AI researchers: **Expert guess:** 2066

Grim milestones

First human to be killed by a robot.

Actual date: 1979

First human killed by a car on auto-pilot.

Actual date: 2016

First human killed by an autonomous military robot.

Actual date: 2020

Robotics

Robot predictions

First automated restaurant.

Actual date: 1895

First robot to navigate autonomously.

Actual date: 1948

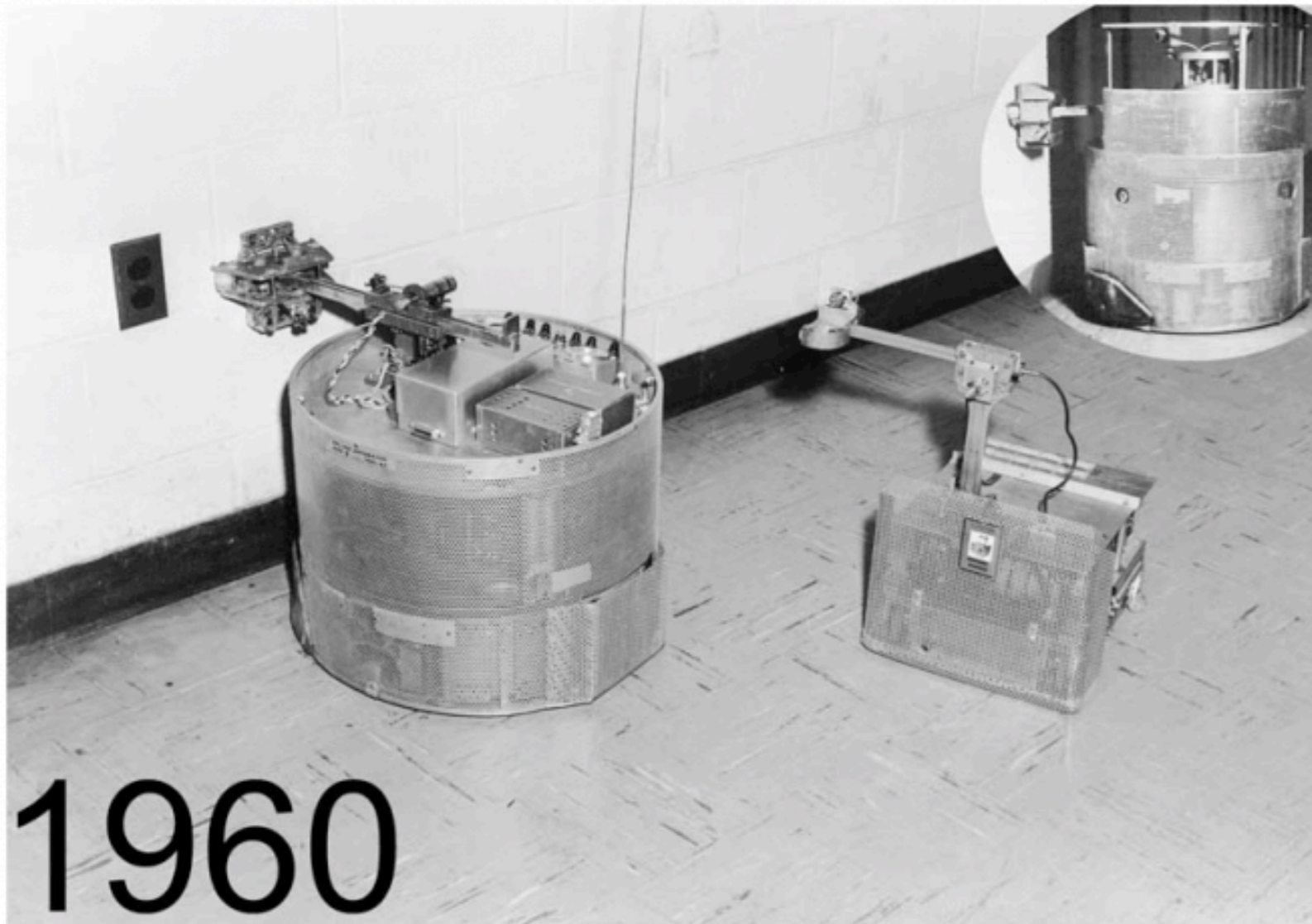
First animal robot.

Actual date: 1956

First robot capable of recharging itself.

Actual date: 1960





The Hopkins Beast

Controlled by dozens of transistors, the Johns Hopkins University Applied Physics Lab's "Beast" wandered white hallways, centering by sonar, until its batteries ran low. Then it would seek black wall outlets with special photocell optics, and plug itself in by feel with its special recharging arm. After feeding, it would resume patrolling. Much more complex than Elsie, the Beast's deliberate coordinated actions can be compared to the

bacteria hunting behaviors of large nucleated cells like paramecia or amoebae.

Embodied task predictions

Fold laundry as well and as fast as the median human clothing store employee.

Expert guess: 2026

Stock products in a grocery store as efficiently as an experienced human.

Beat the fastest human runners in a 5 kilometer race through city streets using a bipedal robot body.

Expert guess: 2036

Physically assemble any LEGO set given the pieces and instructions, using non-specialized robotics hardware.

Expert guess: 2031



RP COMPANY ▼

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Nasdaq 14283.81 0.31% ▲

U.S. 10 Yr -2/32 Yield 1.805% ▼

Crude O

THE WALL STREET JOURNAL.

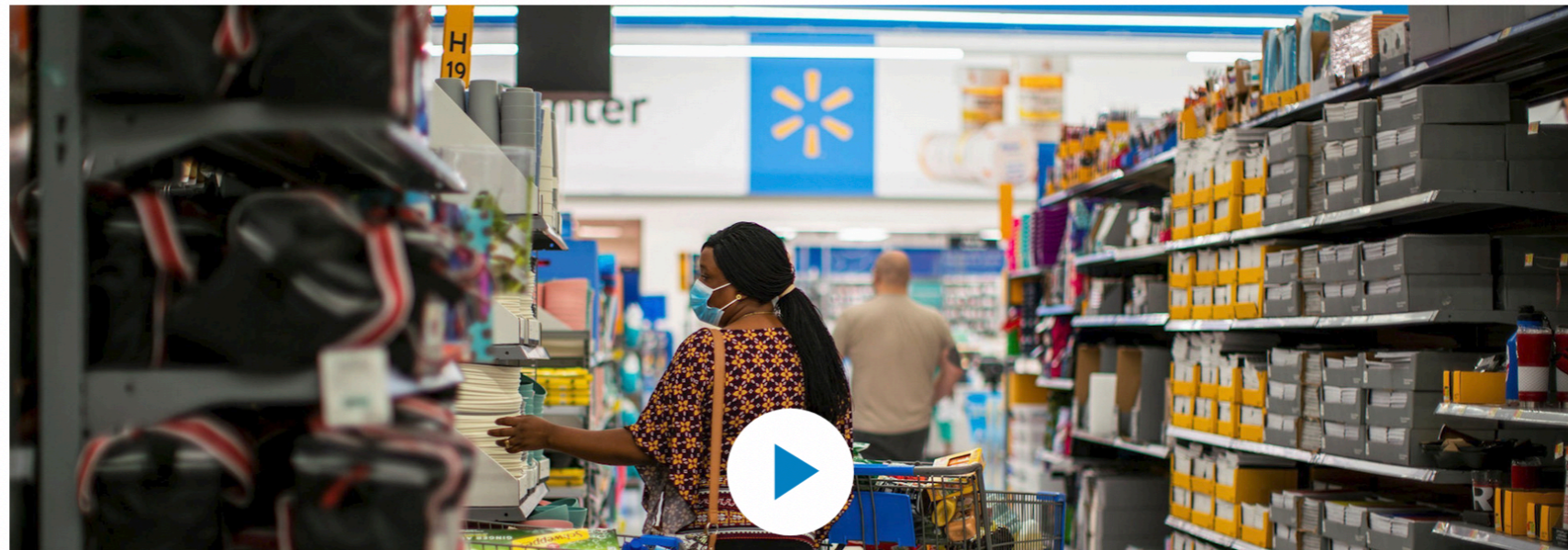
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Walmart Scraps Plan to Have Robots Scan Shelves

Retailer ends contract with robotics company after seeing similar results from workers grabbing online



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**Language
and
Mathematics**

Math task predictions

Write concise, efficient, human-readable Python code to implement simple algorithms like quicksort.

Expert guess: 2036 **Actual date:** 2021

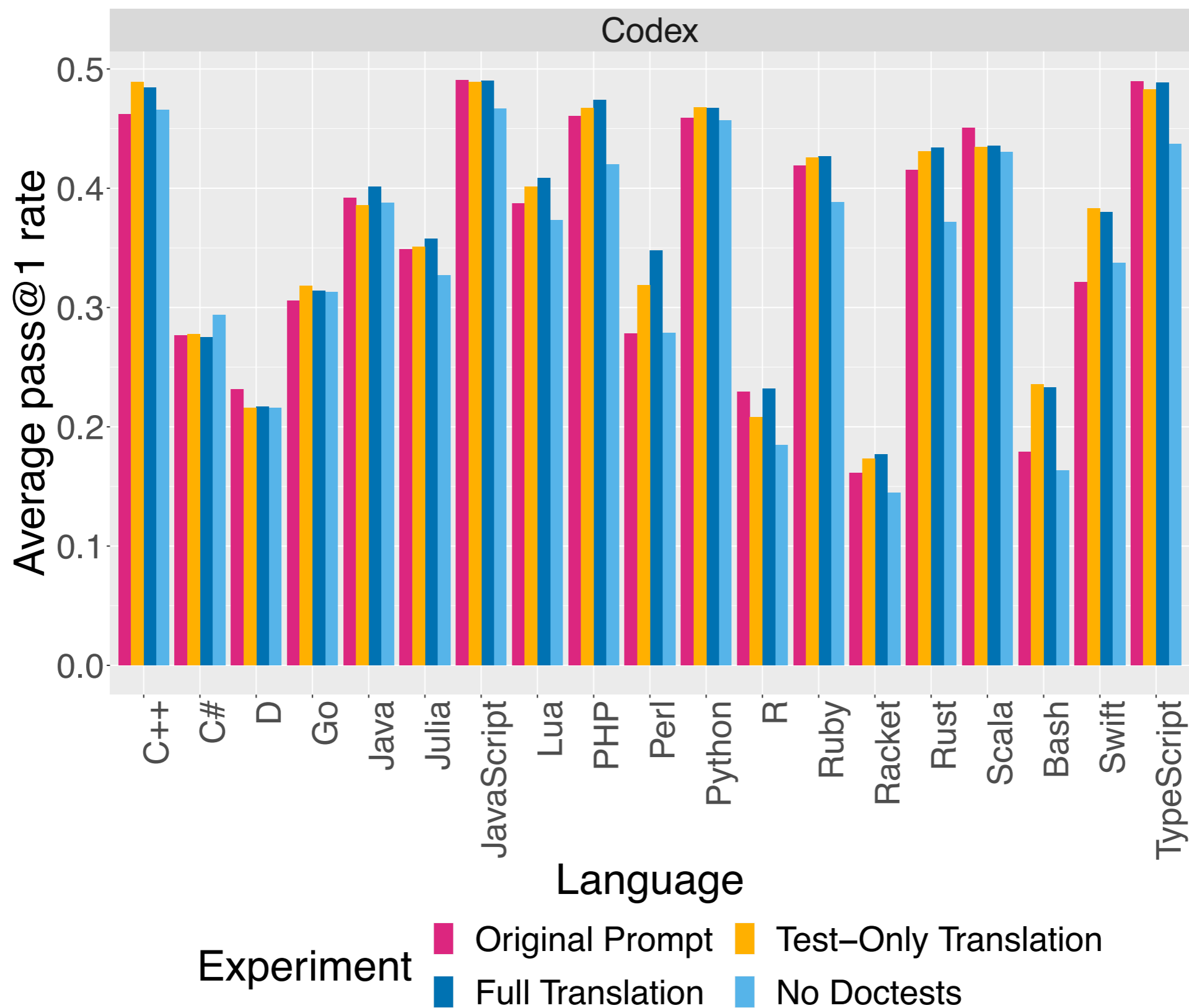
Perform as well as the best human entrants in the Putnam competition.

Expert guess: 2071

Routinely and autonomously prove mathematical theorems that are publishable in top mathematics journals today, including generating the theorems to prove.

Expert guess: 2106

Github Copilot/OpenAI Codex



Language task predictions

Chat with human users in a way that is indistinguishable from a human, for a limited persona and set of topics.

Actual date: 1966

Perform translation about as good as a human who is fluent in both languages but unskilled at translation, for languages with a large amount of text.

Expert guess: 2031 **Actual date:** 2019ish

Provide phone banking services as well as a human.

Expert guess: 2026

Transcribe human speech with a variety of accents in a noisy environment as well as a typical human can.

Expert guess: 2036

Take a written passage and output a recording that can't be distinguished from a voice actor, by an expert listener.

Expert guess: 2031

Games

Game task predictions

Defeat the best Go players.

Actual date: 2017

Defeat the best Go players, training only on as many games as the best Go players have played.

Expert guess: 2036

Consistently play chess better than the best human players.

Actual date: 2006

Play new levels of Angry Birds better than the best humans.

Expert guess: 2022

AI Birds.org

Angry Birds AI Competition



You are here: Home

Welcome to the Angry Birds AI Competition Website

NEW (April 6, 2023): The AIBIRDS 2023 Competition will be held as part of the [IJCAI 2023](#) Conference in Macao, August 24-25, 2023

NEW (July 27, 2022): BamBirds from the University of Bamberg, Germany is the [AIBIRDS 2022 Champion!](#)
Congratulations to Diedrich Wolter and Felix Haase!

Game task predictions

Outperform professional game testers on all Atari games using no game-specific knowledge.

Expert guess: 2031 **Actual date:** 2020

Outperform human novices on 50% of Atari games after only 20 minutes of training play time and no game specific knowledge.

Expert guess: 2026

For any computer game that can be played well by a machine, explain the machine's choice of moves in a way that feels concise and complete.

Expert guess: 2031

Play poker well enough to win the World Series of Poker.

Expert guess: 2021 **Actual date:** 2019

Art and Vision

Art task predictions

Produce a classical music piece that is indistinguishable from a piece by a particular composer.

Actual date: 1993

Produce a song that is indistinguishable from a new song by a particular artist.

Expert guess: 2036

Compose a song that is good enough to reach the US Top 40.

Expert guess: 2036

Write an essay for a high-school history class that would receive high grades.

Expert guess: 2031 **Actual date:** 2023(?)

Write a novel or short story good enough to be on the NYT best-seller list.

Expert guess: 2066

Bach by Design

Computer Composed Music

David Cope -- Experiments in Musical Intelligence



CRC 2184

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> LOAD 'BACH-FUGUES)
> PATTERN-MATCH 'BACH-FUGUES)
> COMPOSE 'MEM-BACH-FUGUES)
(1000 60 156 1 64) (1025 67 156 1 64) (1400 65 156 1 64)
(1719 69 156 1 64) (1875 75 156 1 64) (2031 64 156 1 64)
(2345 77 156 1 64) (2460 72 156 1 64) (2676 65 156 1 64)
(2800 75 156 1 64) (3075 72 156 1 64) (3200 72 156 1 64)
(3434 67 156 1 64) (3594 55 156 1 64) (3760 72 781 1 64)
(3906 50 156 1 64) (4062 48 156 1 64) (4211 50 156 1 64)
(4364 71 156 1 64) (4511 58 156 1 64) (4658 71 156 1 64)
(4804 71 156 1 64) (4950 55 156 1 64) (5100 72 156 1 64)
(5312 71 156 1 64) (5462 52 312 1 64) (5469 72 156 1 64)
(5625 69 156 1 64) (5791 67 156 1 64) (5938 65 156 1 64)
(6091 67 156 1 64) (6250 64 156 1 64) (6350 65 312 1 64)
(6522 75 156 1 64) (6672 72 156 1 64) (6825 72 156 1 64)
(6975 43 625 1 64) (7031 67 156 1 64) (7180 67 156 1 64)
(7331 72 156 1 64) (7480 72 156 1 64) (7630 72 156 1 64)
(7781 72 156 1 64) (7930 72 156 1 64) (8080 72 156 1 64)
(8231 72 156 1 64) (8380 72 156 1 64) (8530 72 156 1 64)
(8681 65 156 1 64) (8830 72 156 1 64) (8980 64 156 1 64)
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Vision task predictions

Correctly group images of previously unseen objects into classes, after training on a similar labeled dataset containing the same classes.

Actual date: 2012

See a short video of a scene, and then be able to construct a 3D model of the scene good enough to create a realistic video of the same scene from a substantially different angle.

Expert guess: 2036 **Actual date:** 2021

Given a plain text description, generate an image of something that is not present in the training data.

Actual date: 2021

One-shot learning: see only one labeled image of a new object, and then be able to recognize the object in real world scenes.

Expert guess: 2036

Single-Shot Scene Reconstruction

Sergey Zakharov¹, Rareş Ambruş¹, Vitor Guizilini¹, Dennis Park¹, Wadim Kehl²,
Fredo Durand³, Joshua B. Tenenbaum³, Vincent Sitzmann³, Jiajun Wu⁴, Adrien Gaidon¹

¹Toyota Research Institute, ²Woven Planet, ³Massachusetts Institute of Technology, ⁴Stanford University

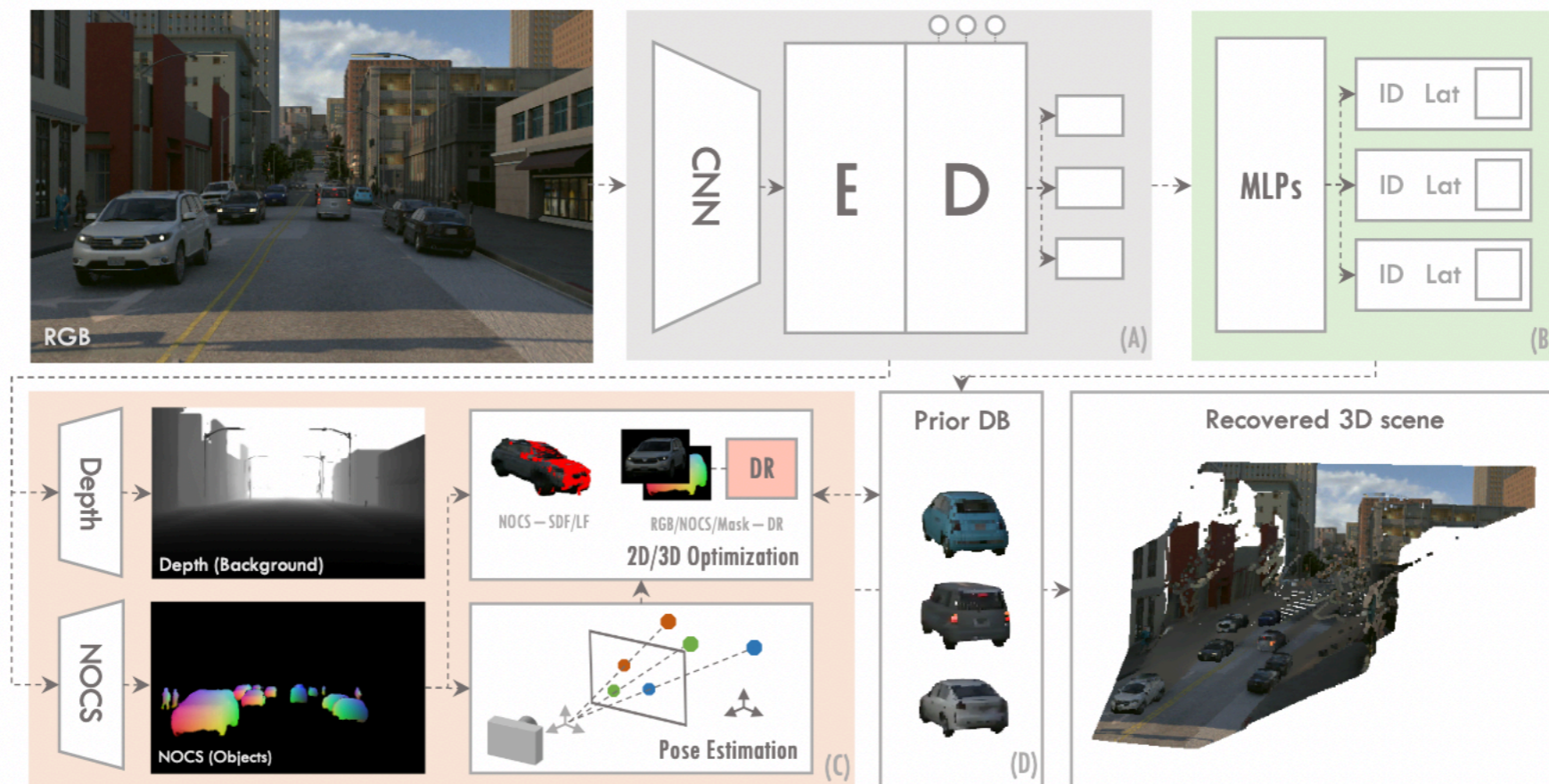


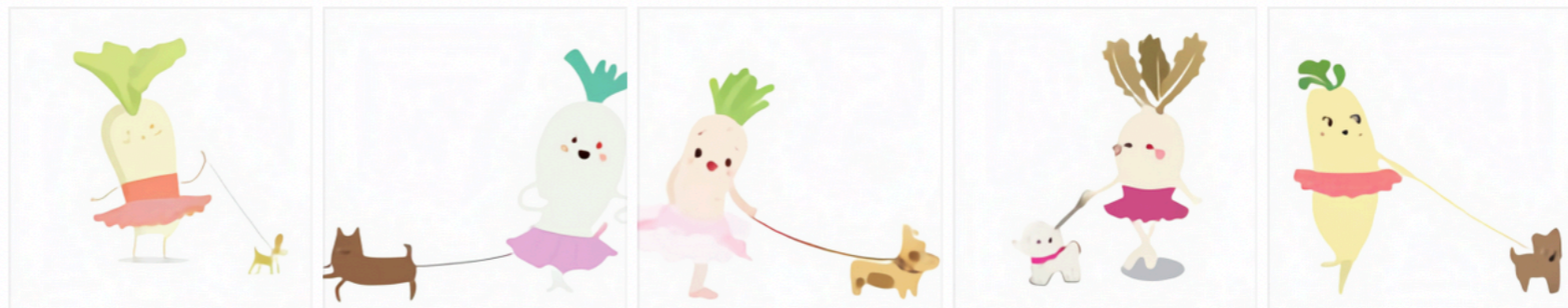
Figure 1: **Scene Decomposition Network (SDN)**: Given an RGB image, our SDN recovers partial canonicalized object shapes in the form of NOCS maps and predicts background depth. NOCS maps are then used to directly estimate object poses using a PnP solver. We further fit learned object priors to align with predicted partial shapes in terms of geometry, appearance, and poses.

DALL·E: Creating Images from Text

TEXT PROMPT

an illustration of a baby daikon radish in a tutu walking a dog

AI-GENERATED IMAGES



[Edit prompt or view more images](#) ↓

TEXT PROMPT

an armchair in the shape of an avocado. . . .

AI-GENERATED IMAGES



[Edit prompt or view more images](#) ↓