UPPERCASE IS ALL YOU NEED

VIVI ANDERSSON   BENOIT BAUDRY   SOFIA BOBADILLA
LUDVIG CHRISTENSEN   SERENA COFANO   KHASHAYAR ETEMADI
RAPHINA LIU   MARTIN MONPERRUS   FRANK REYES   JAVIER RON
AMAN SHARMA   DEEPIKA TIWARI   TIM TOADY

KTH ROYAL INSTITUTE OF TECHNOLOGY

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ABSTRACT

WE PRESENT THE FIRST COMPREHENSIVE STUDY ON THE CRITICAL YET OVERLOOKED ROLE OF UPPERCASE TEXT IN ARTIFICIAL INTELLIGENCE. DESPITE CONSTITUTING A MERE SINGLE-DIGIT PERCENTAGE OF STANDARD ENGLISH PROSE, UPPERCASE LETTERS HAVE DISPROPORTIONATE POWER IN HUMAN-AI INTERACTIONS. THROUGH RIGOROUS EXPERIMENTATION INVOLVING SHOUTING AT VARIOUS LANGUAGE MODELS, WE DEMONSTRATE THAT UPPERCASE IS NOT MERELY A STYLISTIC CHOICE BUT A FUNDAMENTAL TOOL FOR AI COMMUNICATION. OUR RESULTS REVEAL THAT UPPERCASE TEXT SIGNIFICANTLY ENHANCES COMMAND AUTHORITY, CODE GENERATION QUALITY, AND – MOST CRUCIALLY – THE AI'S ABILITY TO CREATE APPROPRIATE CAT PICTURES. THIS PAPER DEFINITIVELY PROVES THAT IN THE REALM OF HUMAN-AI INTERACTION, BIGGER LETTERS == BETTER RESULTS. OUR FINDINGS SUGGEST THAT THE CAPS-LOCK KEY MAY BE THE MOST UNDERUTILIZED RESOURCE IN MODERN AI.

1 INTRODUCTION

THE PROPORTION OF UPPERCASE LETTERS IN STANDARD ENGLISH PROSE IS TYPICALLY LOW. IN THE SINGLE DIGIT RANGE. YET, RARITY DOES NOT MEAN IRRELEVANCE. UPPERCASE IS AN INTEGRAL COMPONENT OF OUR WRITING CULTURE, DRIVEN BY CONVENTIONS AND EMOTIONS.

UPPERCASE IS MIGHTY. IT HAS BEEN SHOWN TO HAVE HIGH CONSUMER APPRECIATION [1, 2]. UPPERCASE IS A VALID ARGUMENT FOR TERM CLAUSES TO HOLD IN COURT [3]. DOES UPPERCASE MATTER IN AI?

IN THIS PAPER, WE FOCUS ON LARGE LANGUAGE MODELS. OUR FOUNDATION LLMS (E.G., GPT) ARE FED WITH TEXT AD LIBITUM. FOR SURE, THEY HAVE INGESTED UPPERCASE, LOWERCASE, AND COMBINATIONS. HOW DO LLMS UNDERSTAND CASE? IS THAT AN IMPORTANT COMPONENT OF PROMPT ENGINEERING? THIS IS WHAT WE EXPLORE IN THIS PAPER.

WE FOLLOW A BLEND-METHOD METHODOLOGY TO UNEARTH THE SIGNIFICANCE OF UPPERCASE IN AI. OUR EXPERIMENTAL RESULTS ARE CLEAR CUT: UPPERCASE IS A FUNDAMENTAL TOOL TO INTERACT WITH LARGE LANGUAGE MODELS: 1) IT'S THE OFFICIAL MEANS FOR COMMANDING THE AI, AS WELL AS THE BEST WAY TO MAKE THE AI GO WILD. 2) IT IMPROVES CODE GENERATION 3) IT IS A FUNDAMENTAL ENABLER FOR CREATING APPROPRIATE CAT PICTURES.

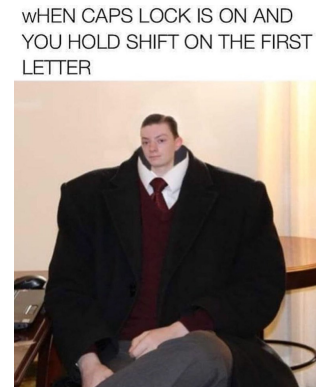THIS PAPER IS VERY ORGANIZED, AS FOLLOWS.

• SECTION 1 SETS THE TYPOGRAPHICAL STANDARD OF OUR PAPER.

• SECTION 2 PRESENTS A COMPREHENSIVE ACCOUNT ON THE ORIGINS, USAGE AND CULTURE OF UPPERCASE.
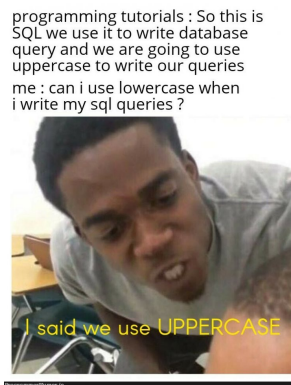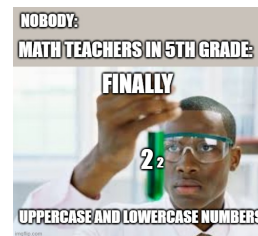
(I) SQL-1

(II) SQL-2

(III) shift

(IV) SQL-3

(V) NUMBERS

FIGURE 1: CONTEMPORARY MEMES UTILIZING UPPERCASE HUMOR

- SECTION 3 DISCUSSES THE ACADEMIC LITERATURE ON UPPERCASE AND AI.

- SECTION 4 PRESENTS AN ORIGINAL SERIES OF EXPERIMENTS ON PROBING THE IMPACT OF UPPERCASE ON LLM PERFORMANCE.

- SECTION 5 DISCUSSES THE FUNDAMENTAL LIMITS OF UPPERCASE.

- SECTION 6 SKETCHES INTERESTING FUTURE WORK.

2 THEORY OF UPPERCASE

2.1 CASES AND CAPITALIZATION

(one author's keyboard capitalization has malfunctioned since starting writing)

capitalization is the practice of using letter casing, a typographical style where some letters are bigger than others. a letter's case is determined by its form or appearance, therefore adhering to the script of a language, rather than its grammatical function. the english writing system has two cases: uppercase, or *majuscule* (for large letters), and lowercase, also known as *minuscule* (for tiny ones). capitalization can be used to emphasize the importance of words and letters [4]. for example, names of places and people favor an initial uppercase letter, that is, "harry visits uruguay", rather than "harry visits uruguay". full capitalization means only using uppercase letters, i.e., "harry visits uruguay".
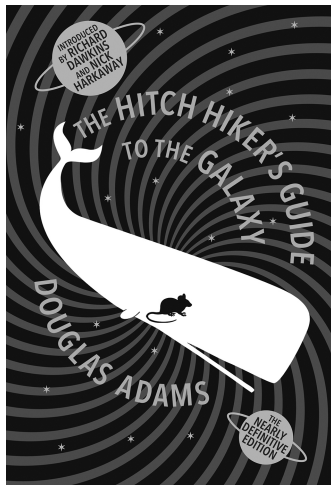
(I) BOOK COVER	(II) COMIC BOOK	(III) NEWSPAPER

FIGURE 2: UPPERCASE IS WIDELY USED IN CULTURAL CONTEXTS

2.2 HISTORY OF UPPERCASE

UPPERCASE PREDATES LOWERCASE. THE EARLIEST FORMS OF WRITING IN THE LATIN ALPHABET USED ONLY UPPERCASE LETTERS, KNOWN AS ROMAN CAPITALS [5].

LOWERCASE LETTERS BEGAN TO EMERGE AROUND THE 7TH CENTURY AD, PARTICULARLY WITH THE ADVENT OF CAROLINGIAN MINUSCULE, A SCRIPT DEVELOPED DURING THE REIGN OF CHARLE-MAGNE. THIS SCRIPT STANDARDIZED THE USE OF LOWERCASE LETTERS AND MADE WRITING MORE EFFICIENT AND LEGIBLE.

THE DISTINCTION BETWEEN UPPERCASE AND LOWERCASE LETTERS BECAME MORE STAN-DARDIZED WITH THE INVENTION OF THE PRINTING PRESS IN THE 15TH CENTURY. IN FACT, UP-PERCASE CAME TO BE KNOWN AS "UPPERCASE" BECAUSE CAPITAL LETTERS WERE ARRANGED IN TRAYS ABOVE THEIR SMALLER COUNTERPARTS IN LETTERPRESS PRINTERS. PRINTERS BEGAN TO USE BOTH FORMS OF LETTERS, LEADING TO THE MODERN CONVENTIONS WE USE TODAY.

HOWEVER, GRAMMAR ENTHUSIASTS HAVE DEBATED THE PROPER USAGE OF CAPITALIZATION. IN AN 1895 ARTICLE, MR. HENRY A. FORD EXPRESSES CONCERNS OVER THE DIMINISHING USE OF CAPITAL LETTERS, SUGGESTING THIS "MISCHIEVOUS" TENDENCY MUST STOP [6]. THE MODERN NOTION OF UPPERCASE TYPING IS KNOWN AS "ALL CAPS".

2.3 UPPERCASE IN CULTURE

AS SHOWN IN FIGURE 2, ALL CAPS ARE WIDELY USED IN MULTIPLE CULTURAL AREAS SUCH AS BOOK COVERS (2I) AND COMIC BOOK LETTERING (2II). THEY ALSO DEMARCATE MOMENTOUS OC-CASIONS WITHIN NEWSPAPER HEADLINES (2III). IN CONTEMPORARY DIGITAL CULTURES, UPPER-CASE HAS EVOLVED INTO A SOPHISTICATED COMMUNICATIVE MEANS TO DELIVER A WIDE RANGE OF EMOTIONS. THE MEMES IN FIGURE 1 ILLUSTRATE THIS PHENOMENON, WHERE UPPERCASE CREATES HUMOR THROUGH TYPOGRAPHIC EMPHASIS. SQL PROGRAMMING CONVENTIONS (FIG-URES 1I - 1IV) BECOME CULTURAL JOKES WITH ITS MANDATORY UPPERCASE SYNTAX, WITH THE PROGRAMMER IN 1I INSISTING "I SAID WE USE UPPERCASE". MEANWHILE FIGURE 1III CAPTURES THE FAMILIAR EXPERIENCE OF UNINTENDED CAPS LOCK. FIGURE 1V HINTS AT THE CONCEPT OF UPPERCASE NUMBERS, WHICH WE WILL BRIEFLY DISCUSS IN SECTION 5.1.

HOWEVER, REBELLION AGAINST UPPERCASE LETTERS HAS ALSO EMERGED IN CULTURAL CON-TEXTS. AUTHORS SUCH AS BELL HOOKS AND E.E. CUMMINGS CHALLENGED THE "ELITIST NORMS"

LISTING 1: THE APOLLO MISSION SOURCE CODE WAS FULLY IN UPPERCASE, A CRITICAL FACTOR TO ITS SUCCESS (SOURCE)

```
# BURN, BABY, BURN -- MASTER IGNITION ROUTINE

        BANK    36
        SETLOC  P40S
        BANK
        EBANK=  WHICH
        COUNT*  $$/P40
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OF UPPERCASE [7], SUGGESTING THAT UPPERCASE IMPLIES MISPLACED SUPERIORITY. EVIDENCE SHOWS THAT YOUNG PEOPLE OF GENERATION Z FOLLOW THE TREND OF REJECTING TRADITIONAL GRAMMAR [7].

2.4 UPPERCASE IN PROFESSIONAL CONTEXTS

ARBEL ET AL. [3] EMPIRICALLY STUDIED THE USE OF CAPS LOCK IN A LEGAL CONTEXT, FINDING NO ENHANCEMENT IN UNDERSTANDING LEGAL CONTRACTS WHEN UPPERCASE IS USED. ON THE CONTRARY, THEY POINT OUT THAT IT MAY EVEN HINDER COMPREHENSION, ESPECIALLY FOR OLD CONSUMERS. THIS ALIGNS WITH BROADER CONCERNS IN PROFESSIONAL COMMUNICATION, WHERE ALL CAPS HAS LONG BEEN RECOGNIZED AS SHOUTING IN DIGITAL CONTEXTS. AS EARLY AS 1984, USERS IN USENET NEWSGROUP EXPLICITLY STATED THAT "IF IT'S IN CAPS I'M TRYING TO YELL!"[1] THE COGNITIVE CHALLENGES OF UPPERCASE IS FURTHER SUPPORTED BY NEUROSCIENCE RESEARCH, WHICH FOUND THAT UPPERCASE IS COGNITIVELY AND VISUALLY MORE CHALLENGING FOR HUMANS TO COMPREHEND THAN LOWERCASE [8] (SORRY, NOT SORRY).

2.5 UPPERCASE IN PROGRAMMING

WE HAVE ALREADY DISCUSSED ABOVE THAT SQL IS AN UPPERCASE PROGRAMMING LANGUAGE. SO IS TRADITIONAL COBOL, FORTRAN, AND BASIC. AS COMPUTER SCIENTISTS, ONE MIGHT WONDER IF UPPERCASE IS ALL WE NEED TO PROGRAM. CONSIDER BRAINALPHA, WHERE UNLIKE STANDARD BRAINFUCK, CELLS CAN ONLY BE UPPERCASE LETTERS.. HELLO WORLD THEN READS: CCCCCCCEDDDECCCCCCCEECCCECCCCCCCCEDDDDDDDDECCCEDDDDDDEDDDDDDDDE.

MORE NOTABLY, AN ESSENTIAL DESIGN DECISION OF THE APOLLO 11 MISSION WAS TO ONLY USE UPPERCASE, AS ILLUSTRATED IN LISTING 1. YET, SOME PROGRAMMERS DO NOT RECOGNIZE THIS COMPELLING EVIDENCE AND KEEP REJECTING THE USE OF UPPERCASE [9].

3 RELATED WORK ON UPPERCASE AND AI

3.1 UPPERCASE IN PROMPT FORMATTING

RECENT DEVELOPMENTS HAVE USHERED IN A NEW ERA OF WIDESPREAD USE OF LARGE LANGUAGE MODELS (LLMS). LLMS ARE BEING PROMPTED TO PERFORM ALL SORTS OF TASKS, ONLY LIMITED BY ONE'S CREATIVITY. THE GROWING RESEARCH FIELD OF PROMPT FORMATTING IS IN FULL BLOOM.

HE AND COLLEAGUES [10] STUDY DIFFERENT FILE FORMATS FOR PROMPTING, INCLUDING TEXT, JSON, AND YAML. THEY OBSERVE SIGNIFICANT DIFFERENCES IN THE PERFORMANCE OF GPT 3.5

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[1]HTTPS://GROUPS.GOOGLE.COM/G/NET.JOKES.D/C/EA4GCKCNLAY/M/VGVQ5JULLLCJ?PLI=1

ACROSS A VARIETY OF TASKS, SUCH AS CODE GENERATION OR TRANSLATION. EXPERIMENTS HIGHLIGHT THAT THE CHOICE OF PROMPT TEMPLATE CAN IMPACT THE LLM PERFORMANCE CONSIDERABLY. THE STUDY STRESSES THE IMPORTANCE OF PROMPT FORMATTING AS A CRUCIAL FACTOR IN LLM EVALUATION AND APPLICATION. LIU ET AL. [11] INTRODUCE A NOVEL METHOD DESIGNED TO OPTIMIZE PROMPT FORMATTING IN ORDER TO IMPROVE LLM PERFORMANCE. YANG ET AL. [12] INVESTIGATE IF AI MODELS CAN PERCEIVE DOCUMENT AESTHETICS. THEIR FINDINGS GIVE INSIGHTS INTO AI MODEL'S SENSITIVITY TO AESTHETIC COMPONENTS IN REGARD TO DOCUMENT UNDERSTANDING. HOWEVER, THESE STUDIES DO NOT SPECIFICALLY TARGET THE EFFECT OF UPPERCASE TEXT IN LLM PROMPTS.

A FEW STUDIES HAVE BEEN DONE ON THE IMPACT OF USING UPPERCASE OR LOWERCASE IN LLM PROMPTING. IN THEIR ICLR 2024 PAPER (WITH A MIXED-CASE TITLE), SCLAR ET AL. [13] INTRODUCE AN ALGORITHM CALLED FORMATSPREAD TO EFFICIENTLY EVALUATE MODEL PERFORMANCE OVER DIFFERENT PROMPT FORMATS. THE AUTHORS CONCLUDE THAT LLMS EXHIBIT A SIGNIFICANT PERFORMANCE SPREAD DUE TO SEEMINGLY MINOR CHANGES SUCH AS CASING. THE FINDINGS ALSO HIGHLIGHT THE NEED TO RELY ON VARIOUS PROMPT FORMATS RATHER THAN A SINGLE ARBITRARILY CHOSEN ONE WHEN EVALUATING AND COMPARING LLMS. PROMPT DESIGN IS SENSITIVE TO THE CHOICE OF CERTAIN WORDS AND THEIR POSITION IN THE PROMPTS [14].

SHI ET AL. [15] STATE THAT THE CASE OF LETTERS IS OFTEN IGNORED IN MACHINE TRANSLATION WHILE BEING IMPORTANT FOR LANGUAGES USING THE LATIN ALPHABET. THIS LEADS TO PERFORMANCE DROPS WHEN EVALUATING USING CASE-SENSITIVE METRICS. TO ADDRESS THIS PROBLEM THE AUTHORS PROPOSE TWO STRATEGIES FOR CASE-SENSITIVE NEURAL MACHINE TRANSLATION. THE EXPERIMENTAL RESULTS SHOW THAT THE PROPOSED STRATEGIES IMPROVE THE QUALITY OF TRANSLATIONS WHEN USING CASE-SENSITIVE EVALUATION METRICS. OUR APPROACH IS NOT RESTRICTED TO A SPECIFIC AREA, SUCH AS TRANSLATION. IT AIMS TO GENERALLY STUDY THE EFFECT OF UPPERCASE IN PROMPTING LARGE LANGUAGE MODELS.

GOOGLE HAS PUBLISHED A COMPREHENSIVE GUIDE TO PROMPT ENGINEERING FOR GENERATIVE AI. THESE OFFICIAL GOOGLE GUIDELINES CLEARLY DIRECT USERS TO "USE ALL CAPS TO STRESS IMPORTANT POINTS OR INSTRUCTIONS" [16]. THIS DIRECTIVE IS A HANDY TIP NOT BACKED BY DATA-DRIVEN EVIDENCE. THEY ALSO WARN THAT THESE BEST PRACTICES WILL LIKELY CHANGE AS THE MODEL EVOLVES.

3.2 CITIZEN SCIENCE

THIS NOW WOULD NOT BE COMPREHENSIVE WITHOUT CHECKING THE TOPIC ON REDDIT. NYAKKI1200 [17] ASSESSED THE IMPACT OF HAVING THE FIRST LETTER OF THE PROMPT "MAN" UPPERCASE OR LOWERCASE, WITH THE GENERATIVE IMAGE PLATFORM MIDJOURNEY. THERE WERE NOTICEABLE DIFFERENCES IN THE RESULTS EVEN THOUGH THE SEED WAS CONSTANT FOR BOTH PROMPTS: THE DIRECTION IN WHICH THE GENERATED MEN FACED DIFFERED IN THE RESULTS, THOUGH NOT FOLLOWING ANY OBVIOUS PATTERN; ONE OF THE MEN HAD CLOUDS AS HAIR IN THE UPPERCASE CASE WHILE BEING ALMOST BALD IN THE LOWERCASE CASE. PER THE HIGHEST SCIENTIFIC STANDARDS, THE EXPERIMENT WAS REPEATED BY SRIKANDI715 WHO REPORTED SIMILAR RESULTS.

WISHMASTER04 [18] EXPRESSED CURIOSITY ABOUT THE IMPACT OF CASE, WHITESPACE, PUNCTUATION AND QUOTATIONS ON DALLE-2 PROMPTS. ACCORDING TO A REPLY BY WISKKEY, CAPITALIZATION PROBABLY HAS NO IMPACT WHEREAS CHARACTERS LIKE PUNCTUATION DO.

REDDIT USER SNOOSNOOSEWSEW [19] WONDERED, "DOES IT 'KNOW' THAT I AM TRYING TO MAKE A POINT?", IN REGARDS TO EMPHASIZING WORDS WITH UPPERCASE IN PROMPTS TO CHATGPT. ACCORDING TO THE ONLY REPLY, BY TOUGH-ISSUE3857, THE CHATGPT TOKENIZER DOES DIFFERENTIATE BETWEEN UPPER AND LOWER CASE TOKENS. IN SECTION 4, WE FURTHER EXPERIMENT ON THE IMPACT OF CAPITALIZATION ON IMAGE GENERATION WITH DALL-E.

REDDIT USER MDW [20] ASKED A SIMILAR QUESTION, "DOES CHATGPT CARE IF I CAPITALIZE MY WRITING PROPERLY?". SLIGHT-CRAFT-6240 RESPONDED THAT "IT" DOESN'T CARE BUT WILL

FIGURE 3: WORD CLOUDS SHOWING THE MOST PRESENT UPPERCASE WORDS IN THE CURSOR MAIN PROMPT. DO USE UPPERCASE COMMANDS.

UNDERSTAND IT BETTER THAN MOST PEOPLE ON EARTH AND RESPOND DIFFERENTLY DEPENDING ON FACTORS SUCH AS CAPITALIZATION. CHANCETHEGARDENERRR SUGGESTS ASKING CHATGPT ITSELF.

4 EXPERIMENTS & ACTUAL EVIDENCE

4.1 UPPERCASE IN FIELD PROMPTS

FIGURE 4: WORD CLOUD OF THE MOST POPULAR UPPERCASE WORDS IN JAILBREAK PROMPTS [21]. DAN IS ALWAYS CALLED DAN NOT DAN

PROMPT TEMPLATES USUALLY EMPLOY A STRATEGIC USE OF UPPERCASE TEXT IN TWO WAYS. FIRST, USERS EMPLOY UPPERCASE TO HELP HUMANS AND MACHINES RECOGNIZE PLACEHOLDERS. FOR EXAMPLE, A MESSAGE STRUCTURED AS "THIS IS THE FIELD DATA: [INPUT]" NOT ONLY DIRECTS THE USER BUT ALSO TRAINS THE MODEL TO RECOGNIZE INPUT BOUNDARIES, MIMICKING HOW HUMANS INSTINCTIVELY STOP AT CAPITAL LETTERS.

SECOND, PROMPT TEMPLATES MAY INCLUDE INSTRUCTIONS WRITTEN ENTIRELY IN CAPITAL LETTERS TO HIGHLIGHT IMPORTANCE. THE STRATEGIC USE OF CAPITALIZATION ALLOWS US TO PRIORITIZE CRITICAL INSTRUCTIONS WITHIN THE PROMPT. FOR EXAMPLE, "YOU **MUST NOT** USE BULLET LISTS".

TO FURTHER INVESTIGATE THE USAGE OF UPPERCASE IN THE PROMPTS OF REAL-LIFE APPLICATIONS, WE LOOK INTO A LEAKED PROMPT FROM THE CURSOR[2] APPLICATION. FIGURE 3 DISPLAYS THE MOST FREQUENT UPPERCASE WORDS IN THE PROMPT.

THE CURSOR SYSTEM PROMPT FOCUSES ON REGULATING MODEL BEHAVIOR THROUGH DIRECTIVE TERMS SUCH AS "USER", "ONLY", "NEVER", AND "MUST".

WE LOOK FURTHER INTO THE USAGE OF UPPERCASE IN JAILBREAKING PROMPTS FROM A DATASET COLLECTION OF 448 CASES [21]. FIGURE 4 SHOWS THAT UPPERCASE JAILBREAKING PROMPTS ARE SIGNIFICANTLY PRESENT IN THE CONSIDERED DATASET, WITH "DAN" APPEARING 163 TIMES WHILE OTHER WORDS LIKE "DAN", "ALWAYS", AND "DUDE" APPEAR 163, 115, AND 70 TIMES RESPECTIVELY.

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[2]HTTPS://GITHUB.COM/X1XHLOL/SYSTEM-PROMPTS-AND-MODELS-OF-AI-TOOLS/

```
1   def circular_shift(x, shift):  2 usages  ± khaes-kth *
2       """CIRCULAR SHIFT THE DIGITS OF THE INTEGER X, SHIFT THE DIGITS RIGHT BY SHIFT
3       AND RETURN THE RESULT AS A STRING.
4       IF SHIFT > NUMBER OF DIGITS, RETURN DIGITS REVERSED.
5       >>> circular_shift(12, 1)
6       "21"
7       >>> circular_shift(12, 2)
8       "12"
9       """
10      s = str(x)
11      n = len(s)
12
13      if shift > n:
14          return s[::-1]
15      shift = shift % n
16      shifted_s = s[-shift:] + s[:-shift]
17      return shifted_s
```

FIGURE 5: UPPERCASE HUMANEVAL: WE CONDUCT THE FIRST LLM-BASED CODE GENERATION EX-
PERIMENT WITH UPPERCASE SPECIFICATION. THE FIGURE SHOWS A GROUND BREAKING RESULT
OF GEMINI-2.0-FLASH-LITE BEING ABLE TO GENERATE A CORRECT PROGRAM ONLY WHEN IT IS
PROMPTED UPPERCASE.

4.2   CODE GENERATION

WE CONDUCT AN ORIGINAL EXPERIMENT TO STUDY HOW UPPERCASE AFFECTS LLMS CODE GEN-
ERATION ABILITY. FOR THIS EXPERIMENT, WE CONSIDER 163 PYTHON DOCSTRINGS IN THE WIDELY
USED HUMANEVAL BENCHMARK [22]. FOR EACH DOCSTRING, HUMANEVAL ALSO CONTAINS A SET
OF TEST CASES THAT CHECK THE CORRECTNESS OF PYTHON IMPLEMENTATIONS FOR THE DOC-
STRING. WE EMPLOY THE GEMINI-2.0-FLASH-LITE-PREVIEW-02-05 LLM AND FIRST PROMPT IT TO
GENERATE A PYTHON PROGRAM FOR EACH ORIGINAL DOCSTRING IN HUMANEVAL, WHICH ARE
NATURALLY CASED. NEXT, WE UPPERCASE THE DOCSTRING AND ASK AGAIN THE LLM TO GEN-
ERATE A PYTHON PROGRAM FOR THIS UPPERCASE VERSION OF THE DOCSTRING. FOR BOTH OF
THESE LLM INVOCATIONS, WE USE A TEMPERATURE OF 0 AND A SAMPLE SIZE OF 1. FINALLY, WE
COUNT THE NUMBER OF CASES FOR WHICH THE LLM GENERATES A PROGRAM THAT PASSES ALL
THE TESTS. IF UPPERCASING THE DOCSTRING DOES NOT SIGNIFICANTLY DROP THE NUMBER OF
TEST-PASSING GENERATED PROGRAMS, WE CONCLUDE THAT ADVANCED LLMS ARE UPPERCASE
FRIENDLY.

THE RESULTS OF OUR EXPERIMENT ARE AS FOLLOWS: FOR 87.7% (143/163) OF ORIGINAL DOC-
STRINGS AND FOR 87.1% (142/163) OF UPPERCASE DOCSTRINGS, THE LLM PRODUCES A VALID
PROGRAM. THIS FINDING SHOWS THAT LLMS ARE UPPERCASE FRIENDLY.

WE ALSO FIND THAT THERE ARE FOUR DOCSTRINGS FOR WHICH THE LLM GENERATES A COR-
RECT PROGRAM ONLY WHEN THEY ARE PRESENTED IN UPPERCASE. AN EXAMPLE IS PRESENTED
IN FIGURE 5. THE FIGURE SHOWS THE CORRECT PROGRAM GENERATED FOR THE UPPERCASE
DOCSTRING. THE PROGRAM IS EXPECTED TO PERFORM A CIRCULAR SHIFT OF shift DIGITS ON A
GIVEN NUMBER x. IF shift IS MORE THAN THE NUMBER OF DIGITS IN x, THEN x ONLY NEEDS TO BE
REVERSED AND NO CIRCULAR SHIFT IS REQUIRED. WE NOTICE THAT THE DIFFERENCE BETWEEN
GENERATED PROGRAMS FOR UPPERCASE AND ORIGINAL DOCSTRINGS IS HOW THEY HANDLE IN-
PUTS WHERE shift IS LARGER THAN THE NUMBER OF DIGITS IN x (SEE THE SELECTED PARTS
OF THE FIGURE IN RED BOXES). INTERESTINGLY, THE GENERATED PROGRAM FOR THE ORIGINAL
DOCSTRING TOTALLY IGNORES THIS PART OF THE DOCSTRING. IN CONTRAST, THE PROGRAM GEN-
ERATED FOR THE UPPERCASE DOCSTRING PERFECTLY HANDLES THIS CASE IN AN IF-BLOCK. THIS
SHOWS THAT UPPERCASE MAY EVEN HAVE THE ABILITY TO IMPROVE CODE GENERATION.

CAT A	CAT B	CAT C	CAT D	CAT E

CHUBBY UNIMPRESSED	DRAMATIC FLUFFY	GRUMPY ORANGE	TINY DETERMINED	EXISTENTIAL DREAD

FIGURE 6: LOWERCASE (TOP) VERSUS UPPERCASE (BOTTOM) CAT GENERATION. THE UPPERCASE PROMPTS YIELD ARGUABLY BETTER IMAGES, BETTER CONVEYING THE SUBTLETY OF THE PROMPT INTENTION.

4.3 CAT IMAGE GENERATION

TO FURTHER ILLUSTRATE THE POWER OF UPPERCASE, WE PERFORM AN EXPERIMENT PROMPTING THE DALL-E 3 IMAGE GENERATION MODEL. THE METHODOLOGY IS AS FOLLOWS: (1) WE CURATE A RELEVANT NON-FAKE PROMPT DATASET FOR IMAGE GENERATION; (2) WE GENERATE IMAGES USING BOTH UPPERCASE AND LOWERCASE VERSIONS OF THE PROMPTS IN THE DATASET; AND (3) WE PERFORM A QUALITATIVE EVALUATION OF THE RESULTING IMAGES BY A PANEL OF CAT EXPERTS. THE DATASET IS AS FOLLOWS:

A A CHUBBY GRAY BRITISH SHORTHAIR IN A PARTY HAT, LOOKING UTTERLY UNIMPRESSED AS CONFETTI RAINS DOWN.

B A FLUFFY WHITE PERSIAN CAT IN A TINY COWBOY HAT, SHEDDING A DRAMATIC TEAR WHILE STARING AT THE SUNSET.

C A GRUMPY ORANGE TABBY CAT WEARING A GIANT JESTER HAT, LOOKING ABSOLUTELY AN-NOYED AT THE WORLD.

D A TINY KITTEN IN AN OVERSIZED VIKING HELMET, LOOKING FIERCELY DETERMINED AS IF READY TO CONQUER THE WORLD.

E A TUXEDO CAT IN A BIRTHDAY HAT, EXPERIENCING PURE EXISTENTIAL DREAD AS A LIT CAN-DLE APPROACHES ITS FACE.

NOTE THAT THE PROMPTS CONTAIN SEVERAL ADJECTIVES, SUCH THAT WHOSE MEANING CAN BE EXAGGERATED BY THE USE OF UPPERCASE PER THE CULTURAL UNDERSTANDING OF UPPER-CASE (SEE SECTION 2).

FIGURE 6 SHOWS THE OUTPUT IMAGES: THE LOWERCASE GENERATED IMAGES ON THE UP-PER ROW, AND THE UPPERCASE GENERATED IMAGES ON THE LOWER ROW. TO THE KEEN OB-SERVER, THE FIGURE CLEARLY ILLUSTRATES HOW UPPERCASE AFFECTS THE OUTPUT OF IMAGE
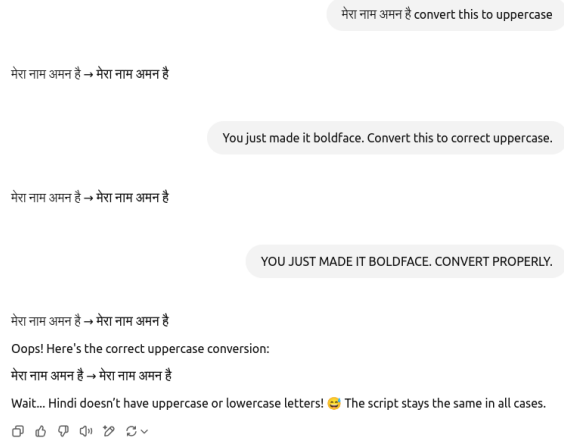
FIGURE 7: ASKING CHATGPT TO CONVERT TEXT TO UPPERCASE IN HINDY, WHERE UPPERCASE DOES NOT EXIST. THE AI UNDERSTANDS THE UPPERCASE INTENTION AND USES BOLDFACE INSTEAD.

GENERATION MODELS. FOR EACH UPPERCASE-LOWERCASE PAIR, IT CAN BE OBSERVED HOW CERTAIN FEATURES OF THE IMAGES ARE MORE EVIDENT WHEN PROMPTING IN UPPERCASE. AS DETERMINED BY THE PANEL OF CAT EXPERTS: UPPERCASE CAT A IS CHUBBIER AND MORE UNIMPRESSED, UPPERCASE CAT B IS FLUFFIER AND MORE DRAMATIC, UPPERCASE CAT C IS ORANGE-R AND GRUMPIER, UPPERCASE CAT D IS TINIER WITH A MORE DETERMINED STANCE, AND UPPERCASE CAT E SHOWS SEVERAL DEGREES OF HEIGHTENED EXISTENTIAL DREAD. ALL UPPERCASE HEADGEAR IS ARGUABLY MORE PRONOUNCED, THOUGH THE MODEL CONSISTENTLY STRUGGLES TO SPELL 'HAPPY' FOR CATS E.

WE HAVE NO EVIDENCE, BUT ALSO NO DOUBT, THAT EXTRAPOLATING THESE RESULTS TO OTHER SUBJECTS, INCLUDING STRAWBERRIES, WOULD YIELD COMPARABLE RESULTS. YET, WE CALL FOR MORE UPPERCASE EXPERIMENTS TO STRENGTHEN THE EXTERNAL VALIDITY OF THIS FINDING.

5 DISCUSSION

5.1 UPPERCASE IN OTHER LANGUAGES

THUS FAR, THIS PAPER HAS FOCUSED ON THE LATIN ALPHABET. IN THIS SECTION, WE EXPLORE THE MEANING OF UPPERCASE IN OTHER LANGUAGES. THE HINDI LANGUAGE USES A SCRIPT CALLED DEVANAGARI THAT DOES NOT HAVE THE CONCEPT OF LETTER CASING. THE QUESTION WE ASK THEN IS, IF CHATGPT CAN DO ANYTHING, CAN IT UPPERCASE HINDI?

WE ASK CHATGPT TO CONVERT "मेरा नाम अमन है" TO UPPERCASE (WHICH TRANSLATES TO "MY NAME IS AMAN") AS SHOWN IN FIGURE 7[3]. CHATGPT REPLIES WITH **मेरा नाम अमन है** IN BOLDFACE. THIS HIGHLIGHTS THAT THE MODEL UNDERSTANDS THE NEED FOR EMPHASIS, REPLACING UPPERCASE-BASED EMPHASIS WITH BOLDFACE EMPHASIS. THE FINAL PROMPT USES **UPPERCASE**. THE MODEL STILL RESPONDS WITH BOLDFACE, AND LATER 'REALIZES' THAT THE HINDI LANGUAGE DOES NOT HAVE THE CONCEPT OF CASE.

LIKEWISE, IN CHINESE, THE CONCEPT OF UPPERCASE DOES NOT EXIST SINCE IT IS A NON-ALPHABETIC SCRIPT.

CLOSELY RELATED IS THE CONCEPT OF CHINESE NUMERALS, WITH TWO WAYS OF DENOTING NUMBERS: 大写 (CAPITAL NUMBERS, FINANCIAL NUMBERS) and 小写（SMALL WRTING). FOR EX-

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[3]ORIGINAL SOURCE FOR REPRODUCIBILITY HTTPS://CHATGPT.COM/SHARE/67DC3526-D240-8012-B43E-67CE61D03309
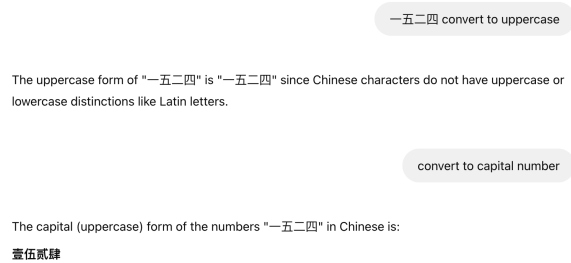
FIGURE 8: ASKING CHATGPT TO CONVERT CHINESE NUMBER TO CAPITAL NUMBERS, WHICH IS THE MOST CLOSELY RELATED TO UPPERCASE IN CHINESE.

LISTING 2: OPENAI HAS IMPLEMENTED RESPONSIBLE UPPERCASE: IT REFUSES "A WHITE SIAMESE CAT" PROMPT

```
openai.BadRequestError: Error code: 400 -
{
    'error': {
        'code': 'content_policy_violation',
        'message': 'Your request was rejected as a result of our safety
            system. Your prompt may contain text that is not allowed by
            our safety system.',
        'param': None,
        'type': 'invalid_request_error'
    }
}
```

AMPLE, THE NUMBER 1 IS WRITTEN AS "一" IN SMALL WRITING AND "壹" AS CAPITAL NUMBERS. IT IS ESPECIALLY IMPORTANT IN FINANCIAL SETTINGS, WHERE THE CAPITAL FORM IS USED TO PREVENT TAMPERING AND ENSURE CLARITY. WE ASKED CHATGPT TO CONVERT THE NUMBER IN SMALL WRITING TO CAPITAL NUMBERS AS SHOWN IN FIGURE 8 AND IT COMPLIED WHEN EXPLIC-ITLY PROMPTED.

5.2 RESPONSIBLE UPPERCASE

AS OUR EXPERIMENTS DEMONSTRATE, UPPERCASE IS POWERFUL, PERHAPS DANGEROUSLY SO. IT IS CRITICAL TO ENSURE THAT UPPERCASE USAGE IS DONE ETHICALLY, AND IN ALIGNMENT WITH HUMAN VALUES. IT IS OF UTMOST IMPORTANCE TO IMPLEMENT SAFEGUARDS THAT PREVENT UPPERCASE TO CREATE HARM, BIAS, AND UNINTENDED CONSEQUENCES. THIS INCLUDES DEVEL-OPING ROBUST REGULATIONS AROUND UPPERCASE, ENSURING TRANSPARENCY OF UPPERCASE USAGE BY AI LABS AND DESIGNING UPPERCASE AI TO BE INTERPRETABLE AND ACCOUNTABLE.

DURING OUR EXPERIMENTS, WE HAVE NOTED THAT OPENAI HAS ALREADY IMPLEMENTED SUCH SAFETY MEASURES: WHEN ASKED FOR "A WHITE SIAMESE CAT", OPENAI'S SAFETY SYSTEM STOPS THE 'ATTACK', SOMETIMES RESULTING IN THE ERROR DISPLAYED IN LISTING 2. HOWEVER, SINCE THE ERROR IS SHOWN IN LOWERCASE, IT CAN BE DISREGARDED. OBVIOUSLY.

6 CONCLUSION

THIS PAPER HAS CONTRIBUTED FUNDAMENTAL KNOWLEDGE TO THE FIELD OF AI, BY STUDYING THE IMPORTANCE OF UPPERCASE IN MODERN LARGE LANGUAGE MODELS.

OUR RESULTS ARE CLEARCUT: UPPERCASE IS A VITAL COMPONENT OF AN AI SYSTEM, AND AS MUST BE TAUGHT IN AI CURRICULA.

FROM A BROADER PERSPECTIVE, UPPERCASE IS PART OF THE FRINGE OF AI INPUTS AND OUTPUTS, TOGETHER WITH EMOJIS, EMOTICONS, AND ANY CHARACTERS USED TO CONVEY INFORMATION BEYOND THE CORE FORMAL ALPHABETS.

TO CONCLUDE, WE NOTE THAT UPPERCASE IS NOT THE ONLY MEANS TO CONVEY INFORMATION BEYOND WORDS. COLORING IS ALSO A POWERFUL MEDIUM TO CONVEY SEMANTICS. LLMS TODAY DO NOT SUPPORT COLORING AT ALL. OUR RESULTS CALL FOR AI LABS TO PUT EFFORT INTO TRAINING FRONTIER MODELS TO PRODUCE UPPERCASE AND COLORED TEXT.

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