

PREDICTIVE ANALYTICS Assignment Project Exam Help

<https://powcoder.com>

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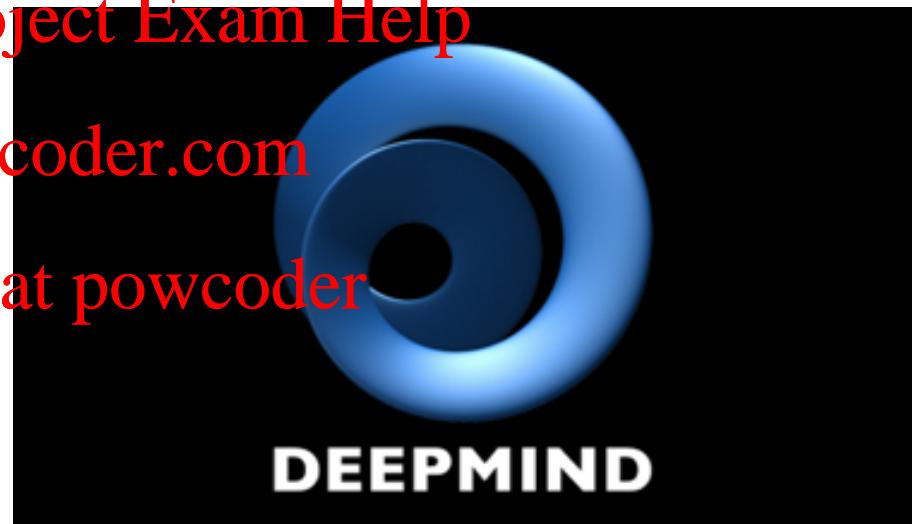
A P MOORE

Assignment Project Exam Help
How much better is
<https://powcoder.com>
prediction than it used to be?
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T0954 / 6CVZ

T0965 / 6D2V

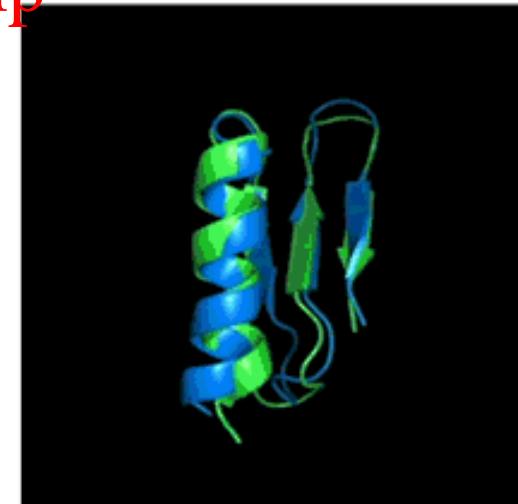
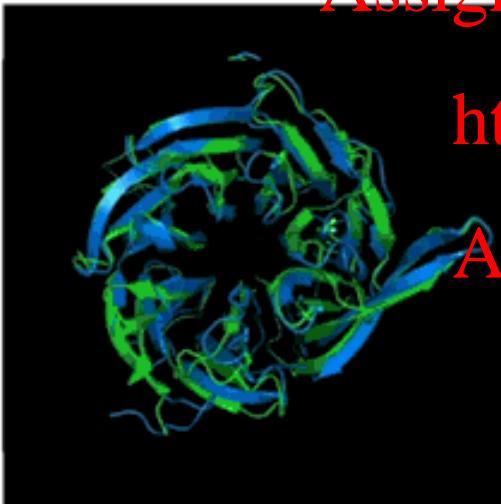
T0955 / 5W9F

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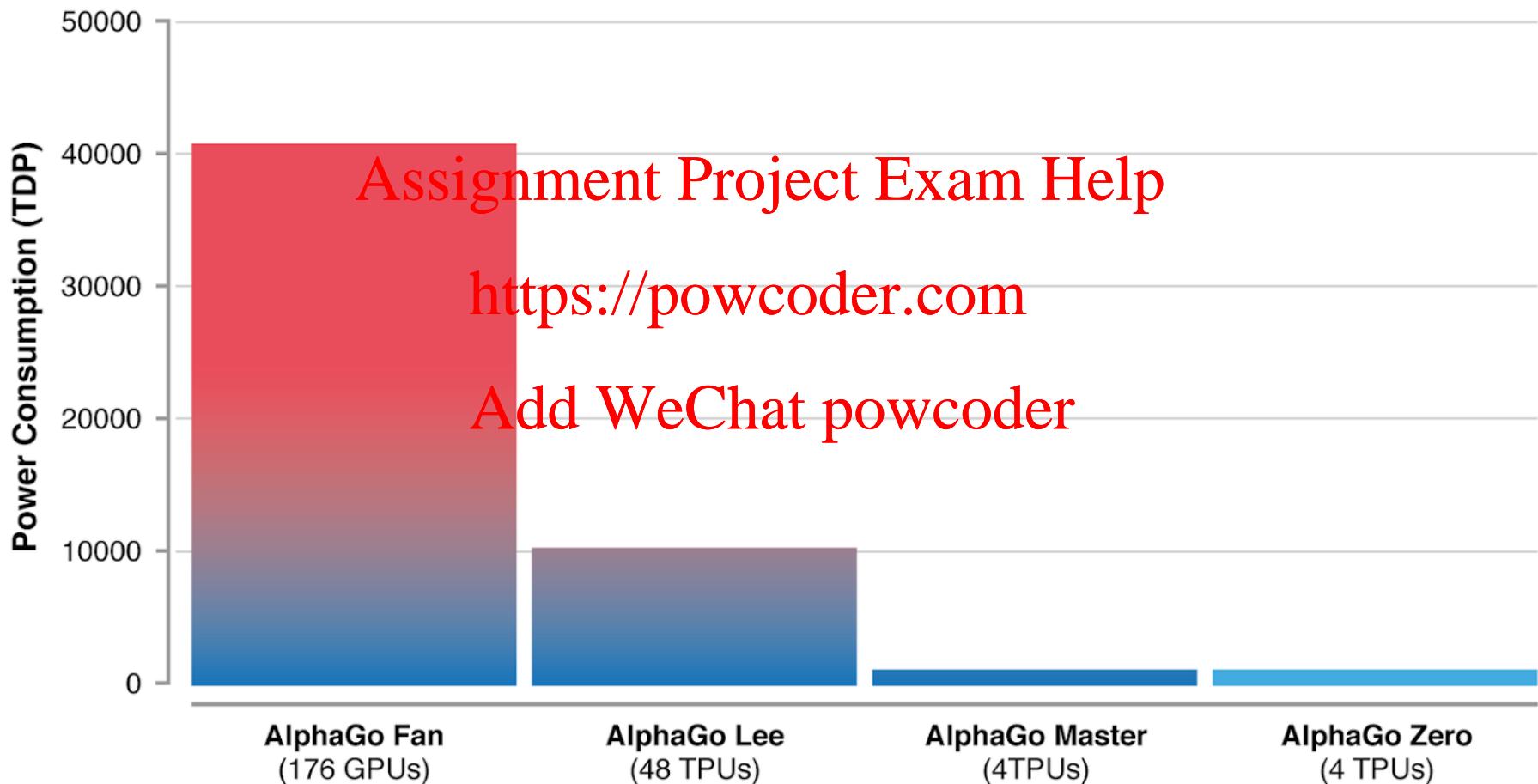
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Structures:
Ground truth (green)
Predicted (blue)

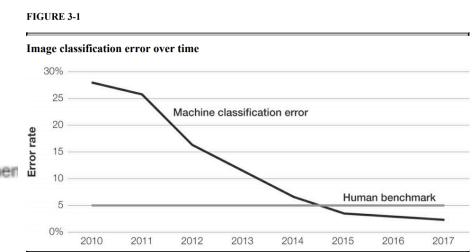
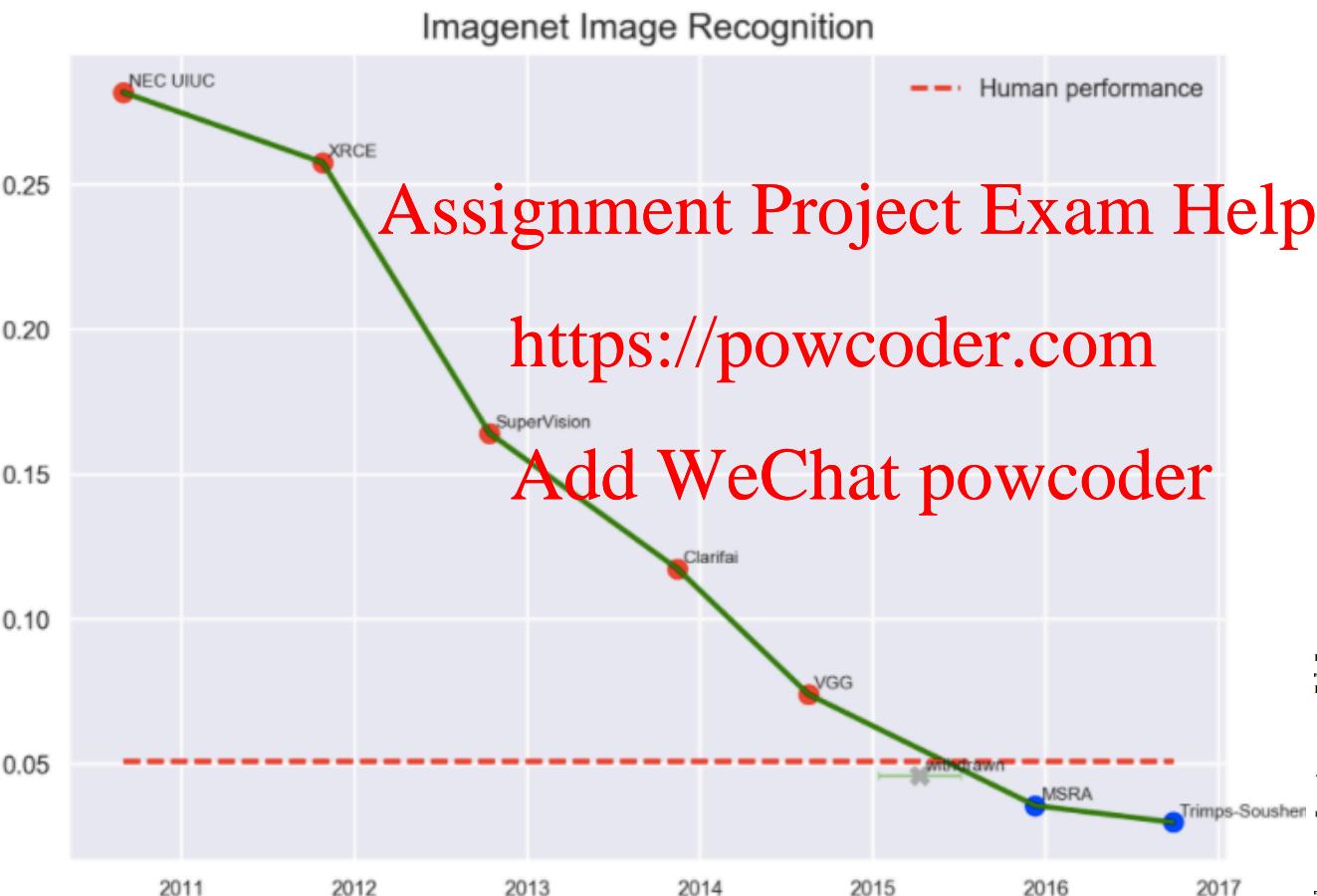


ALPHA GO

TRAINING EFFICIENCY



IMAGENET PERFORMANCE



AUTONOMOUS VEHICLES

CHEAP CAMERAS



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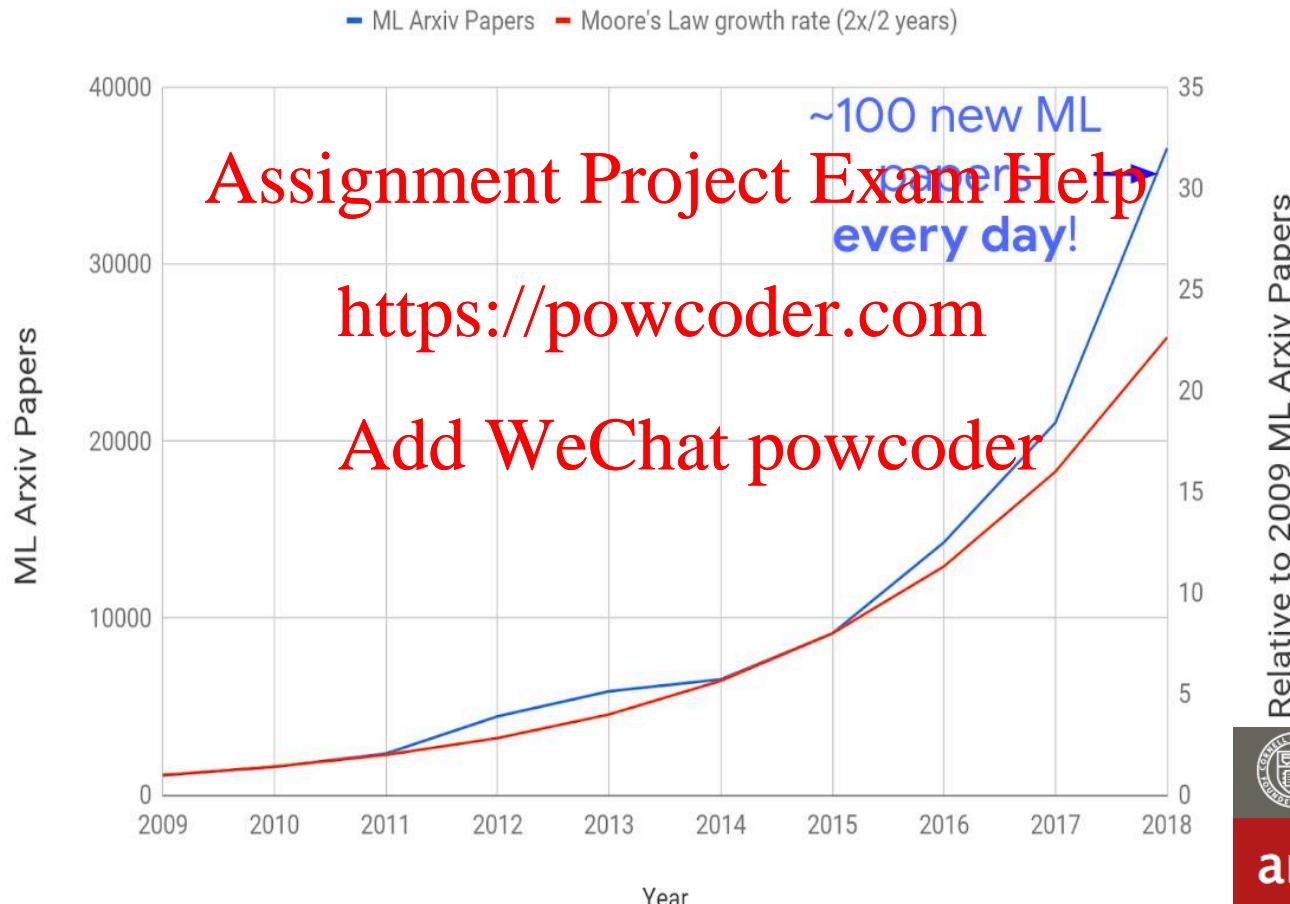
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MACHINE LEARNING PUBLICATIONS

ARXIV PAPERS PER YEAR

UCL
SCHOOL OF
MANAGEMENT



Source: <https://bit.ly/2JU4BmE>

HOW DO I GET STARTED?

Josh Gordon
@random_forests

With TensorFlow 2.0 soon to be released, I have a couple of educational recommendations for you. 1/

4:07 PM · Sep 30, 2019 · Twitter Web App

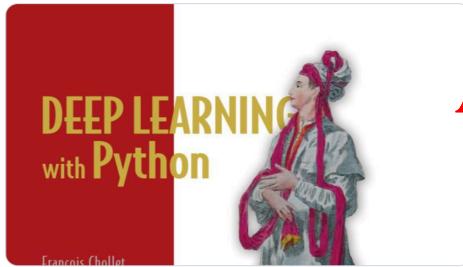
Josh Gordon @random_forests · Sep 30
Replying to @random_forests

TF2 is based on Keras. If you're new to DL, the best place to start is with the "Keras book" (DL with Python) by @fchollet.

github.com/fchollet/deep-...

The code from this book also works inside TF, just by changing an import

`import keras` -> `from tensorflow import keras` 2/



1 40 193

Josh Gordon

@random_forests · Sep 30
Next, you should read Hands-on ML, 2nd edition by @aureliengeron
github.com/ageron/handson...

This book is excellent, and dives deeper into TF2 (including introducing the new Keras Subclassing API, GradientTapes, and so on).

Be sure to get the 2nd edition! 3/



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Josh Gordon

@random_forests · Sep 30
As always, before diving in to DL, it's helpful to develop background in the ML landscape (DL is small part of it).

@aureliengeron's book starts with ML basics in scikit-learn - one of my all time favorite libraries - and to this day has some of the best examples around. 4/

1 9 75

Josh Gordon

@random_forests · Sep 30

If you'd like videos that dive deeper into scikit-learn and ML in general, @amueller's AppliedML course is an excellent free resource:

youtube.com/channel/UCMEXg... 5/



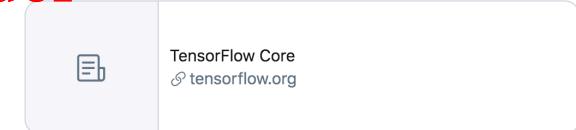
Andreas Mueller
youtube.com

1 29 184

Josh Gordon

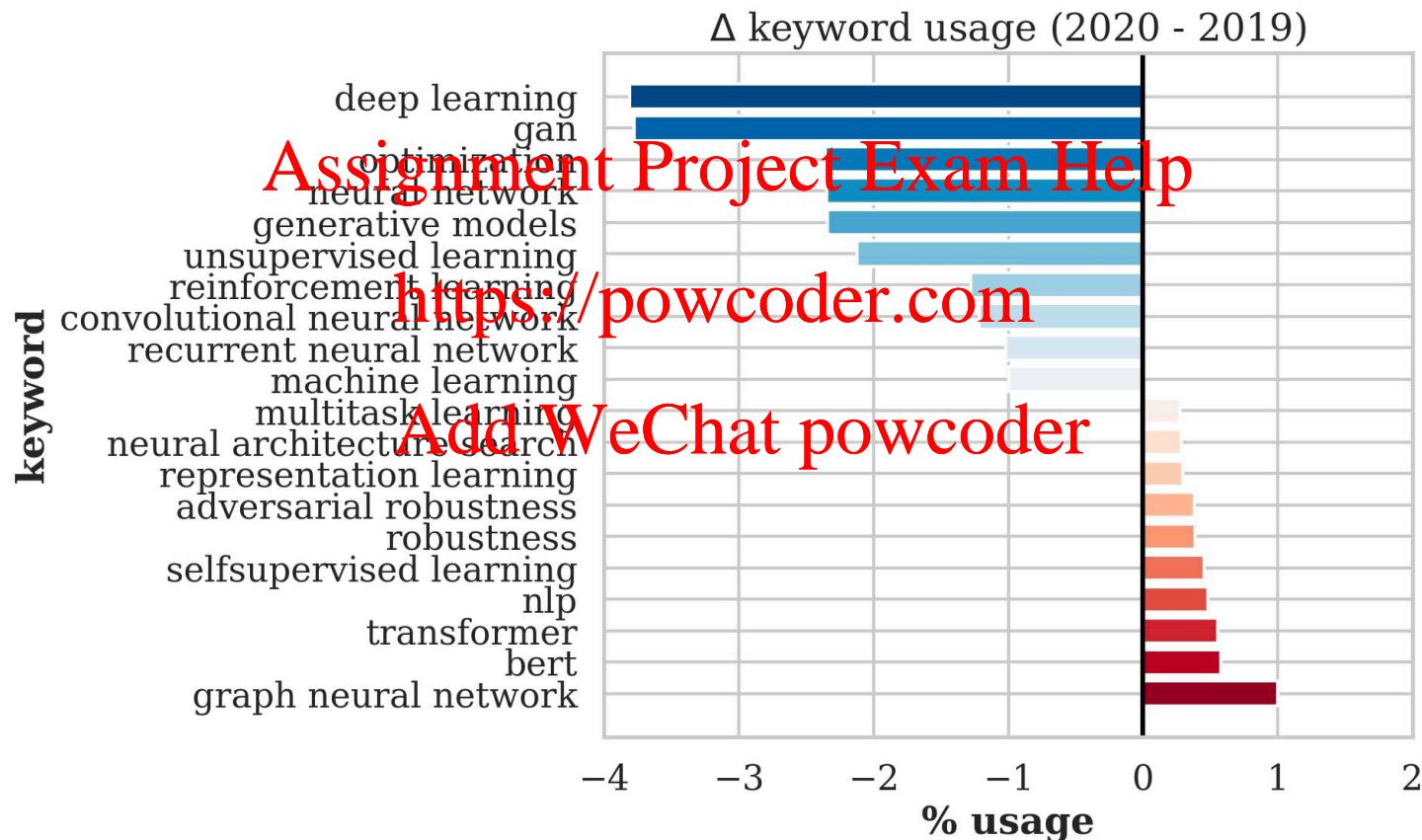
@random_forests · Sep 30
Finally, All the latest tutorials for TF2 are at tensorflow.org/tutorials/.

I'm pretty happy w the coverage in terms of topics. Over the next 6 months, we have a lot of work to do in terms of narrative/flow (right now, this feels like a bag of stuff) - but it's a start. Have fun!



ICLR2020 PAPER SUBMISSIONS

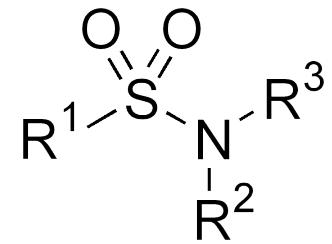
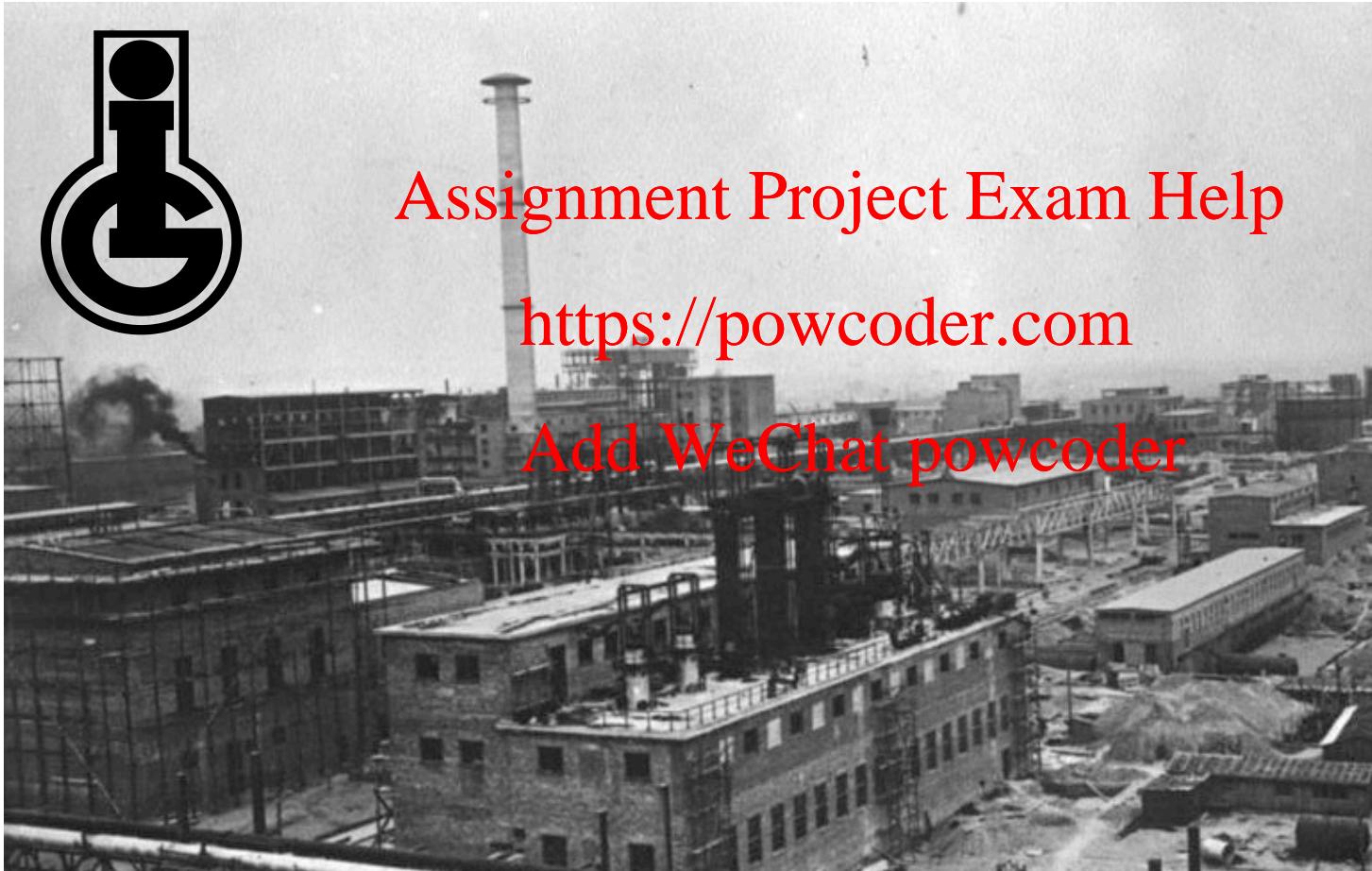
TRANSFORMERS, NLP, BERT...

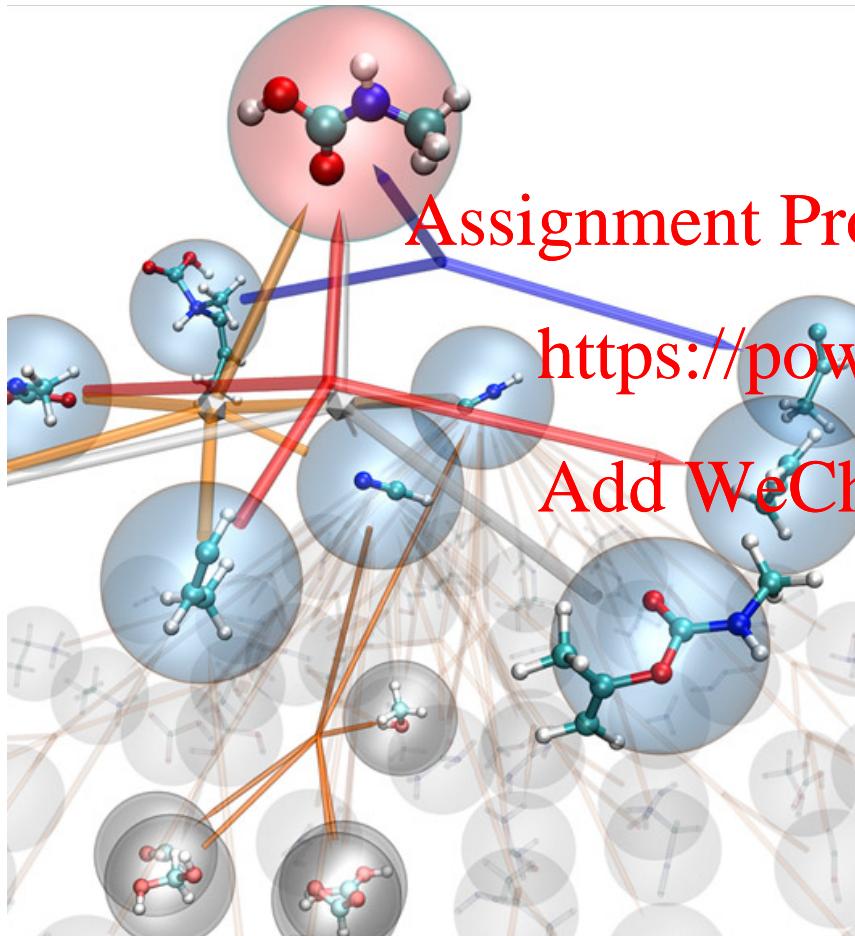


INDUSTRIALISATION

INTERESSENGEINSCHAFT FARBENINDUSTRIE AG

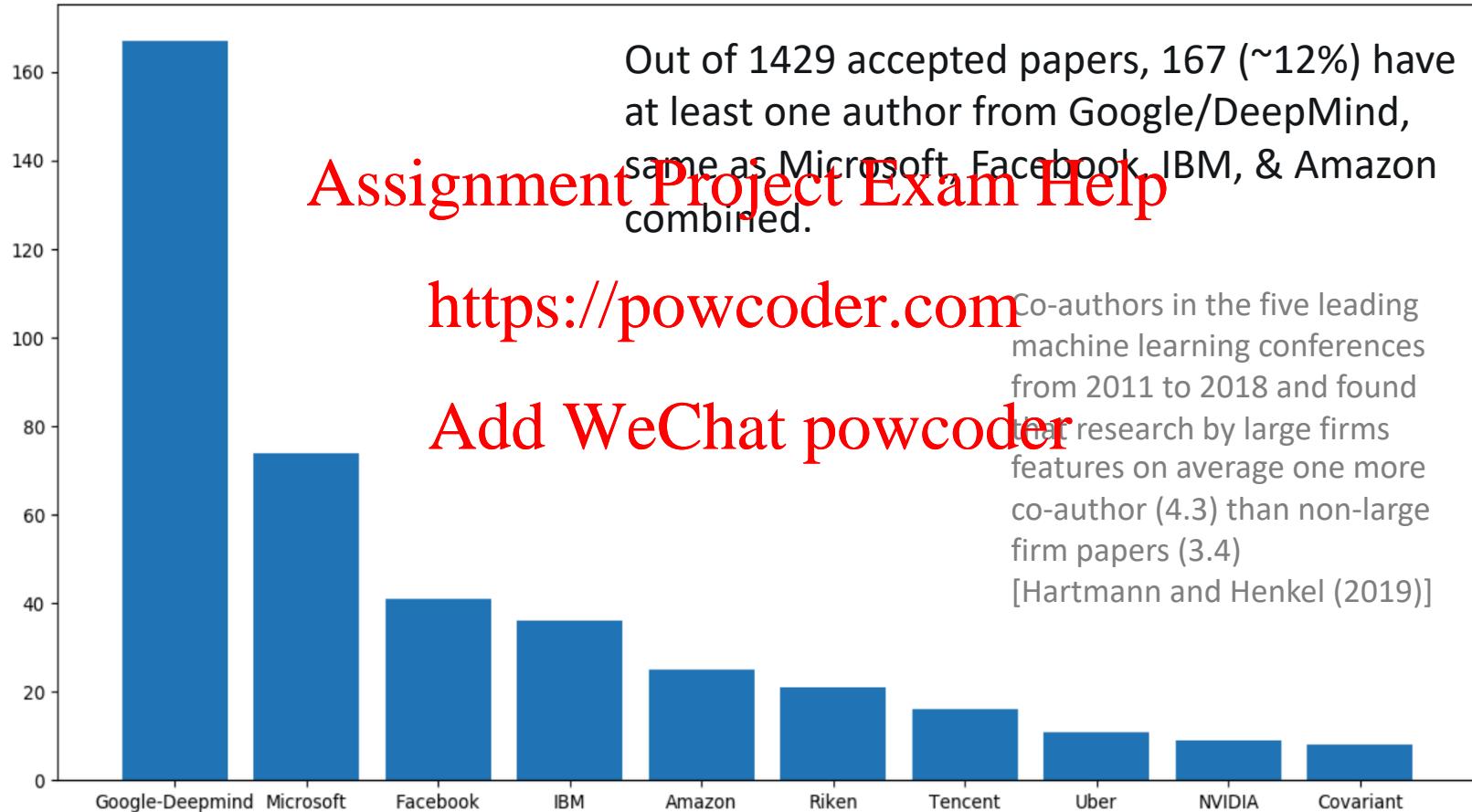
("DYE INDUSTRY SYNDICATE, INC.") COMMONLY KNOWN AS **IG FARBEN**





CORPORATE PUBLICATIONS

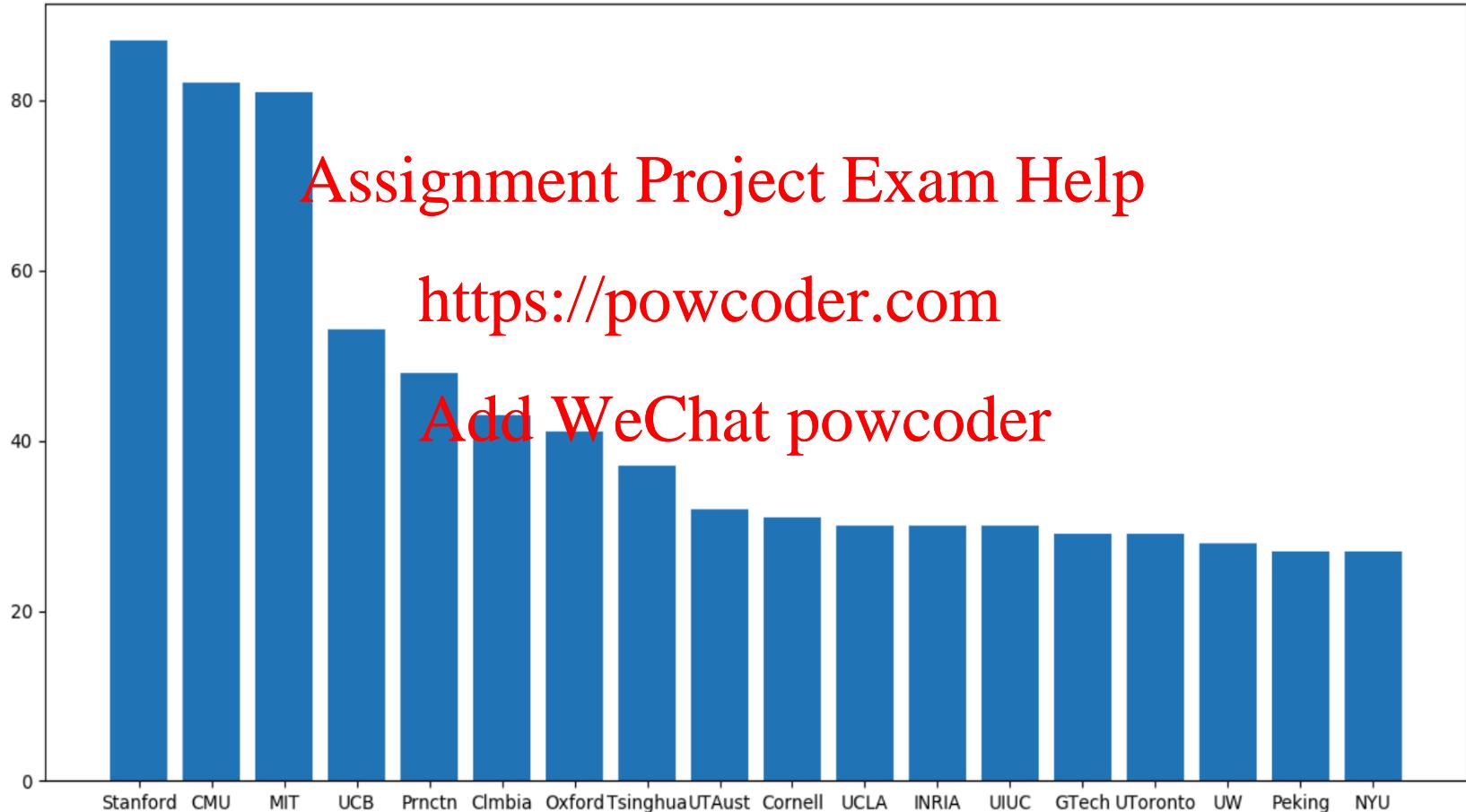
TOP 10 NEURIPS 2019 CONTRIBUTORS



UNIVERSITY PUBLICATIONS

TOP 18 NEURIPS 2019 CONTRIBUTORS

UCL
SCHOOL OF
MANAGEMENT



Source: <https://twitter.com/chipro/status/1170174478304759809>

LANGUAGE BENCHMARKS

7TH JUNE 2019

GLUE SuperGLUE

Tasks

Leaderboard

FAQ

Diagnostics

Submit

Login

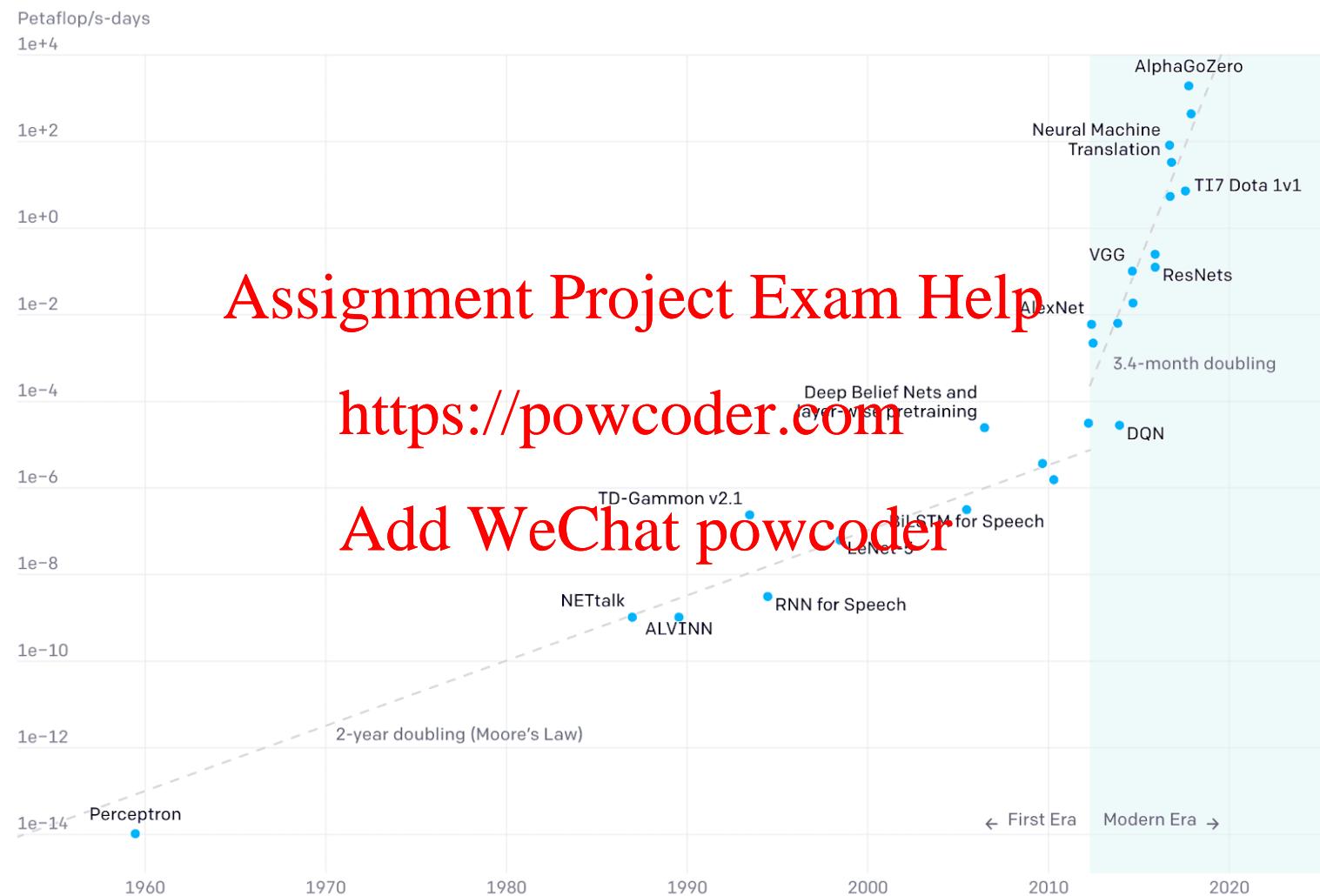
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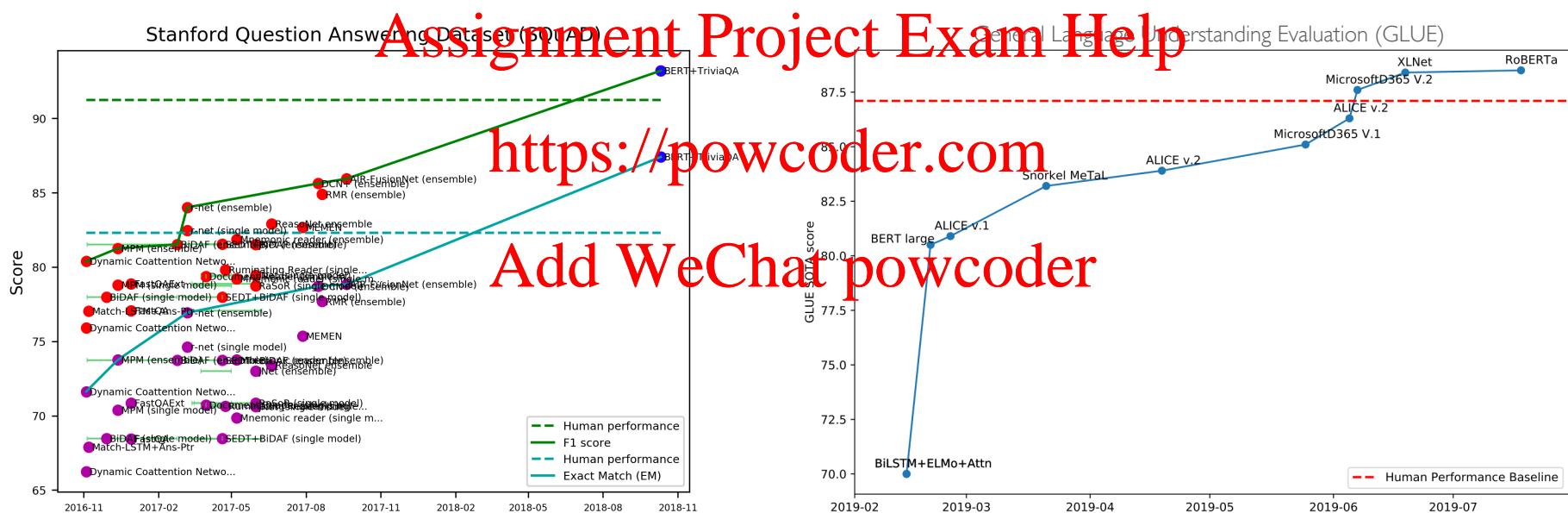
| Rank | Name | Model | URL | Score | CoLA | SST-2 | MRPC | STS-B | QQP | MNLI- <i>H</i> | MNLI-mm | QNLI | RTE | WNLI | AX |
|------|----------------------------|---|---|-------|------|-------|-----------|-----------|-----------|----------------|---------|------|------|------|------|
| 1 | XLNet Team | XLNet-Large (ensemble) |  | 88.4 | 67.8 | 96.8 | 93.0/90.7 | 91.6/91.1 | 74.2/90.3 | 90.2 | 89.8 | 98.6 | 86.3 | 90.4 | 47.5 |
| + | Microsoft D365 AI & MSR AI | MT-DNN-ensemble |  | 87.6 | 68.4 | 96.5 | 92.7/90.3 | 91.1/90.7 | 73.7/89.9 | 87.9 | 87.4 | 96.0 | 86.3 | 89.0 | 42.8 |
| 3 | GLUE Human Baselines | GLUE Human Baselines |  | 87.1 | 66.4 | 97.8 | 86.3/80.8 | 92.7/92.6 | 59.5/80.4 | 92.0 | 92.8 | 91.2 | 93.6 | 95.9 | - |
| + | 4 王玮 | ALICE large ensemble (Alibaba DAMO Academy) |  | 86.9 | 66.6 | 95.8 | 92.5/91.2 | 91.1/91.5 | 74.4/80.7 | 88.2 | 87.9 | 95.7 | 83.5 | 80.8 | 43.9 |
| 5 | Stanford Hazy Research | Snorkel MeTaL |  | 83.2 | 63.8 | 96.2 | 91.5/88.5 | 90.1/89.7 | 73.1/89.9 | 87.6 | 87.2 | 93.9 | 80.9 | 65.1 | 39.9 |
| 6 | XLM Systems | XLM (English only) |  | 83.1 | 62.9 | 95.6 | 90.7/87.1 | 88.8/88.2 | 73.2/89.8 | 89.1 | 88.5 | 94.0 | 76.0 | 71.9 | 44.7 |
| 7 | 张倬胜 | SemBERT |  | 82.9 | 62.3 | 94.6 | 91.2/88.3 | 87.8/86.7 | 72.8/89.8 | 87.6 | 86.3 | 94.6 | 84.5 | 65.1 | 42.4 |
| 8 | Anonymous Anonymous | BERT + BAM |  | 82.3 | 61.5 | 95.2 | 91.3/88.3 | 88.6/87.9 | 72.5/89.7 | 86.6 | 85.8 | 93.1 | 80.4 | 65.1 | 40.7 |
| 9 | Nitish Shirish Keskar | Span-Extractive BERT on STILTs |  | 82.3 | 63.2 | 94.5 | 90.6/87.6 | 89.4/89.2 | 72.2/89.4 | 86.5 | 85.8 | 92.5 | 79.8 | 65.1 | 28.3 |
| 10 | Jason Phang | BERT on STILTs |  | 82.0 | 62.1 | 94.3 | 90.2/86.6 | 88.7/88.3 | 71.9/89.4 | 86.4 | 85.6 | 92.7 | 80.1 | 65.1 | 28.3 |

TWO DISTINCT ERAS OF COMPUTE IN AI



NLP PROGRESS

PERFORMANCE ON PUBLIC BENCHMARKS CAN RIVAL HUMAN PERFORMANCE



MANY APPLICATIONS

| Decision Support & Reasoning | Natural Language Processing | Computer Vision | Robotics & Autonomous Vehicles | Gaming & Simulations | Knowledge Management | Artificial Creativity | Automation & Control |
|------------------------------------|---|-------------------------------|-----------------------------------|----------------------|--------------------------------------|------------------------------|---------------------------------|
| Forecasting & Predictive Analytics | Chatbots | Image Processing | Cognitive Robotics | Game AI | Data Mining | Video Generation | Planning & Scheduling |
| Machine Learning Systems | Natural Language Understanding & Generation | Object Identification | Cybernetics | Path Finding | Knowledge Representation & Reasoning | Image Generation | Target Recognition |
| Classification & Labelling | Speech Recognition | Facial Recognition | Autonomous Robots | Virtual Reality | Topic Modelling | Linguistic Creativity | Automatic & Intelligent Control |
| Recommender Systems | Speech Generation | Object Tracking | Vehicular Automation | Swarm Intelligence | Information Extraction | Visual & Artistic Creativity | |
| Cluster Analysis | Text Summarisation | Optical Character Recognition | Intelligent & Multi-Agent Systems | | | Musical Synthesis | |
| Diagnosis & Expert Systems | Machine Translation | | | | | | |
| | Sentiment Analysis | | | | | | |

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QUESTIONS WE WOULD LIKE ANSWERED

-
- **Descriptive** Analytics, which use data aggregation and data mining to provide insight into the past and answer:

“What has happened?” Assignment Project Exam Help

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- **Predictive** Analytics, which use statistical models and forecasts techniques to understand the future and answer:
“What could happen?”

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- **Prescriptive** Analytics, which use optimization & simulation algorithms to advice on possible outcomes and answer:
“What should we do?”

- CAC/LTV Analysis
- Cohort Analysis
- Funnel Analysis
- Customer Segmentation
- ...

Past

- Click Through Prediction
- Demand Prediction
- Fraud Detection
- Sentiment Analysis

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- Recommender Systems
- Fraud Detection
- Predictive Lead Scoring
- Dynamic Pricing
- ...

Future

Descriptive

“What has happened?”

Predictive

“What could happen?”

Prescriptive

“What should we do?”

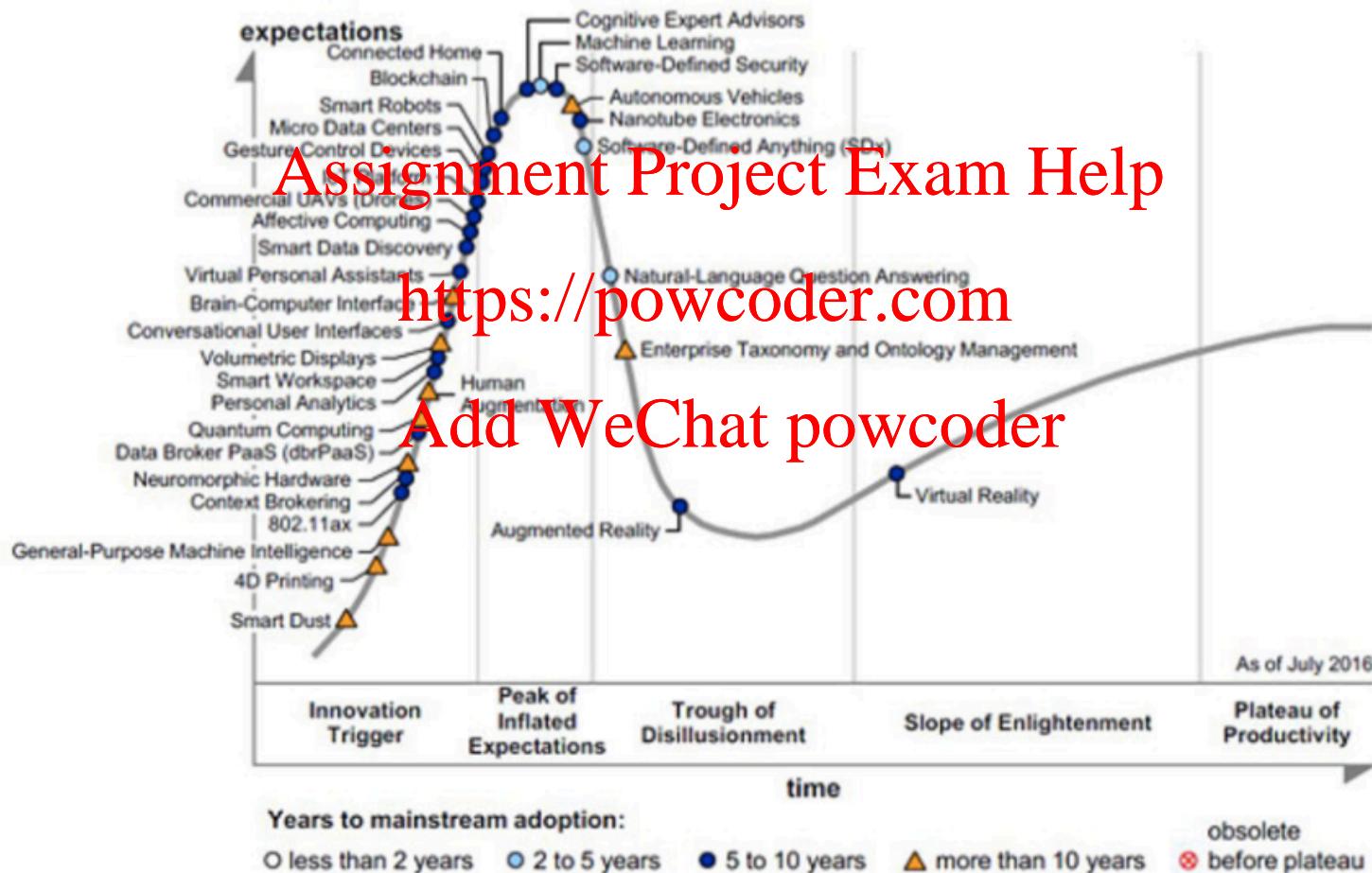
HYPE?

GARTNER HYPE CYCLE, 2016

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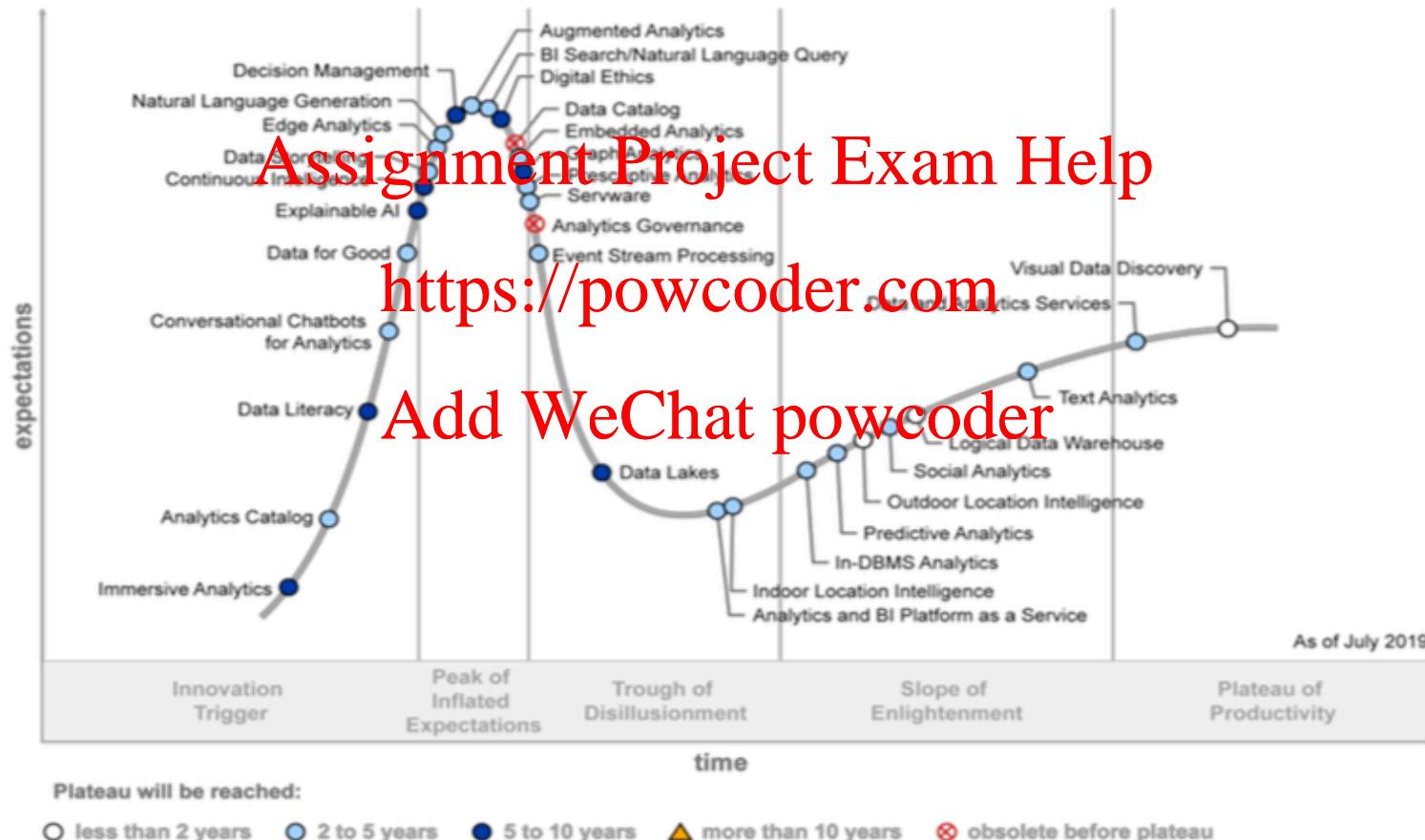
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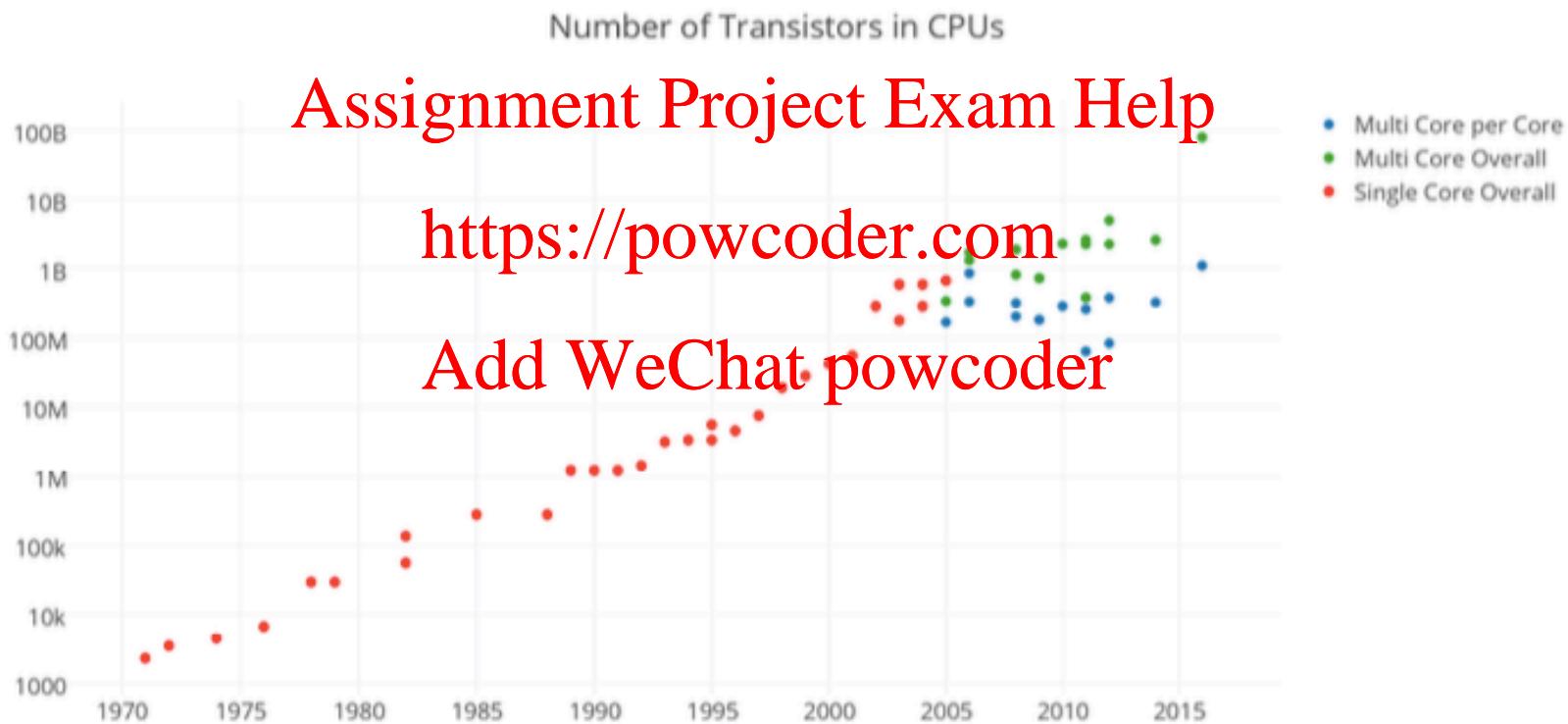


ANALYTICS AND BUSINESS INTELLIGENCE

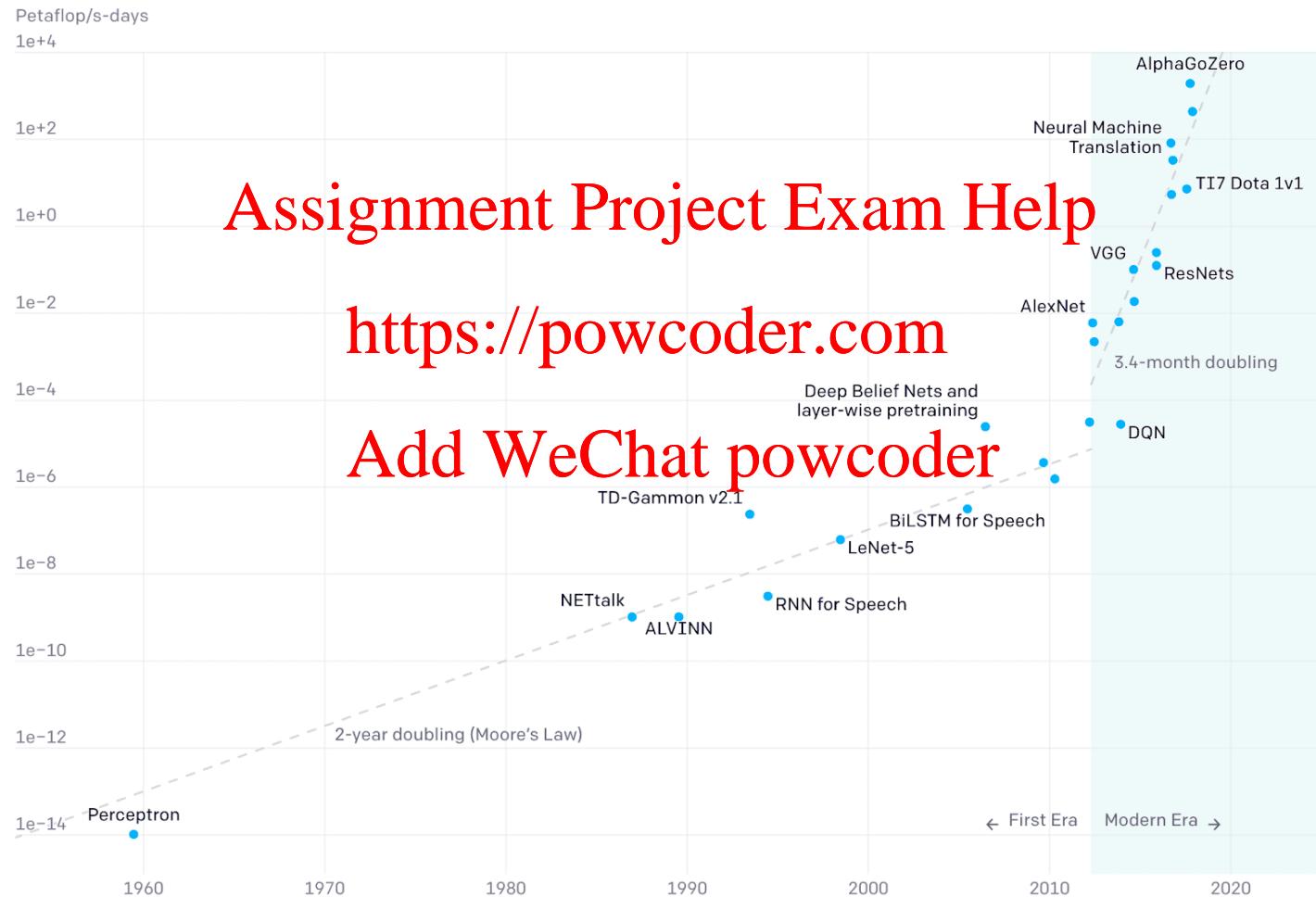
GARTNER HYPE CYCLE, JULY 2019



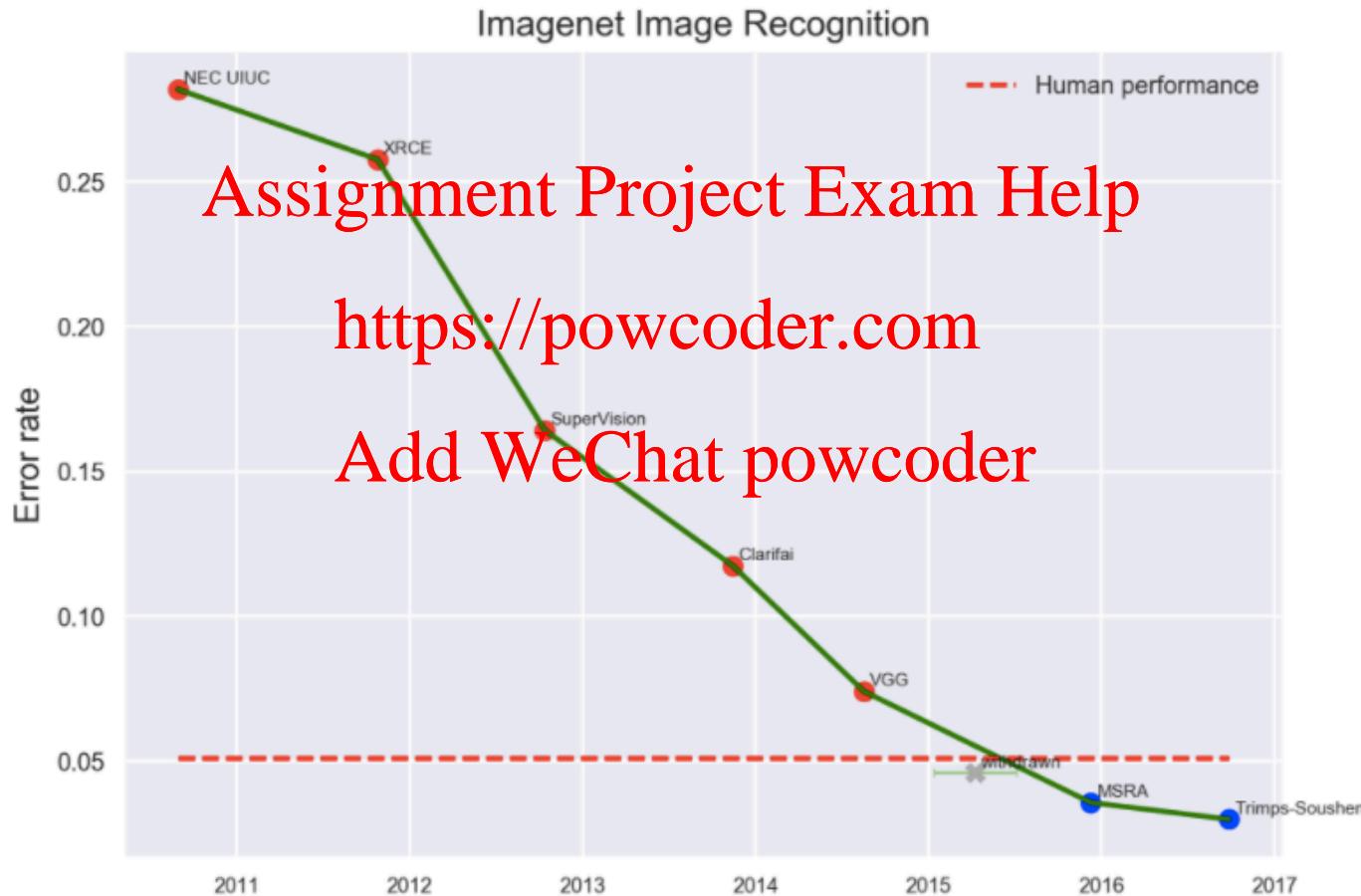
RISE OF COMPUTING POWER



TWO DISTINCT ERAS OF COMPUTE IN AI



IMAGENET PERFORMANCE

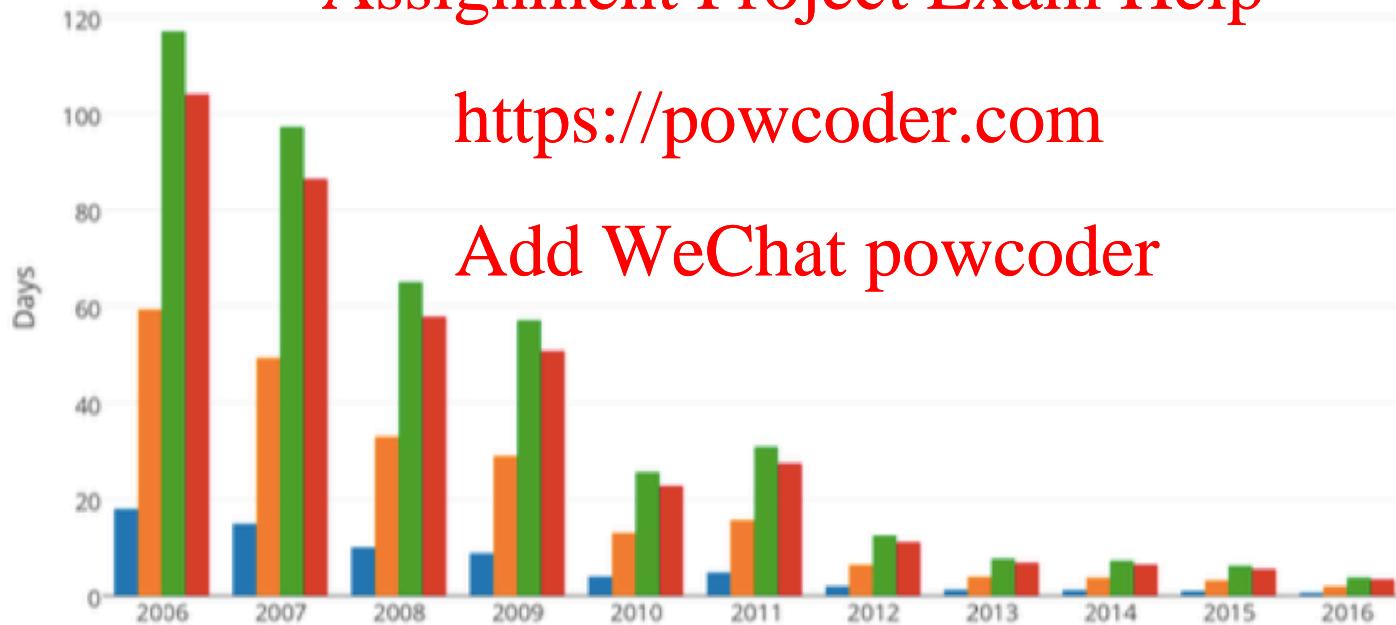


One Million Iterations Training Time

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<https://powcoder.com>

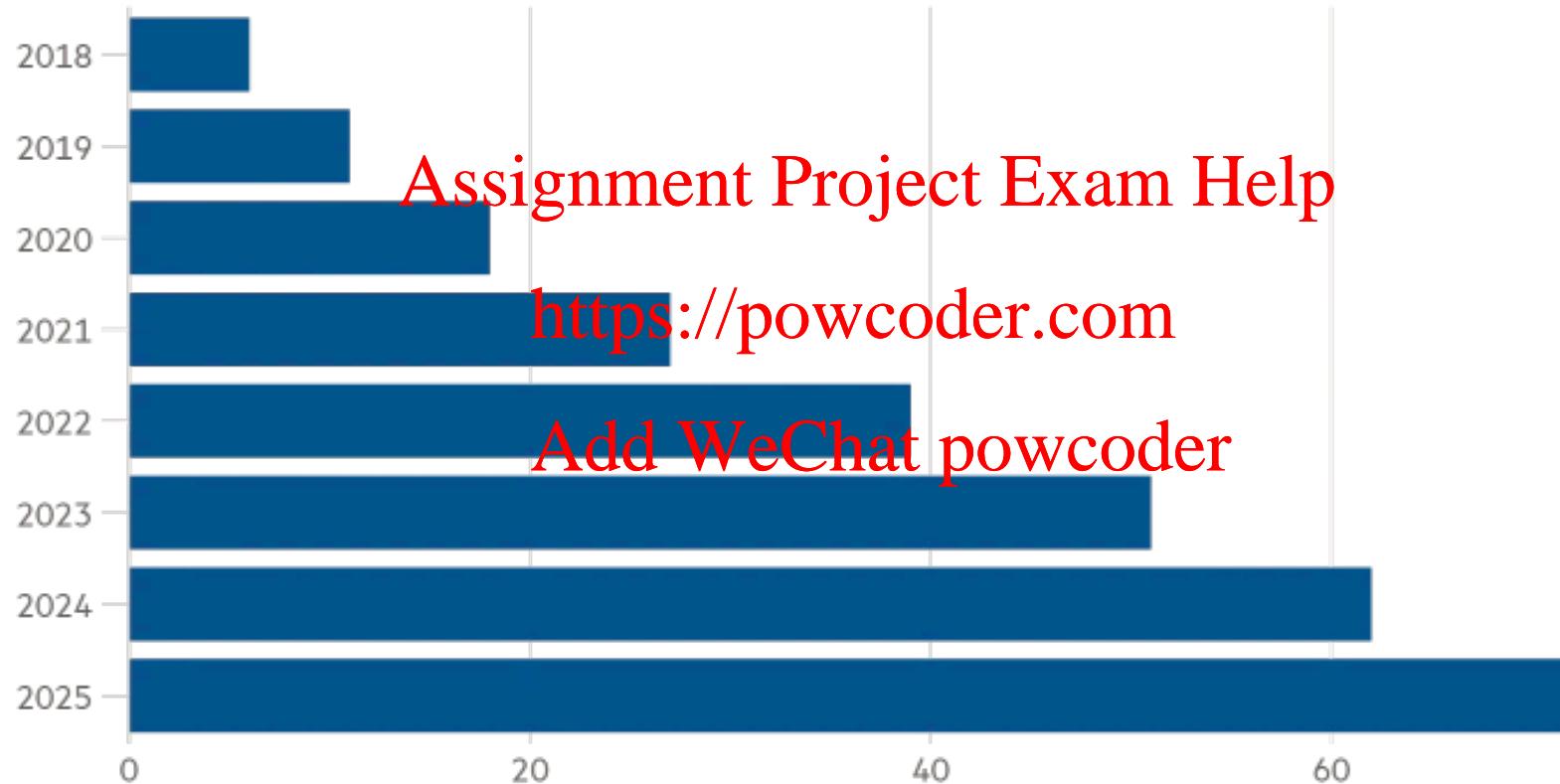
- AlexNet
- Overfeat
- OxfordNet
- GoogleNet



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PROJECTED GROWTH OF DEEP LEARNING CHIPSETS

GLOBAL REVENUE (\$bn)



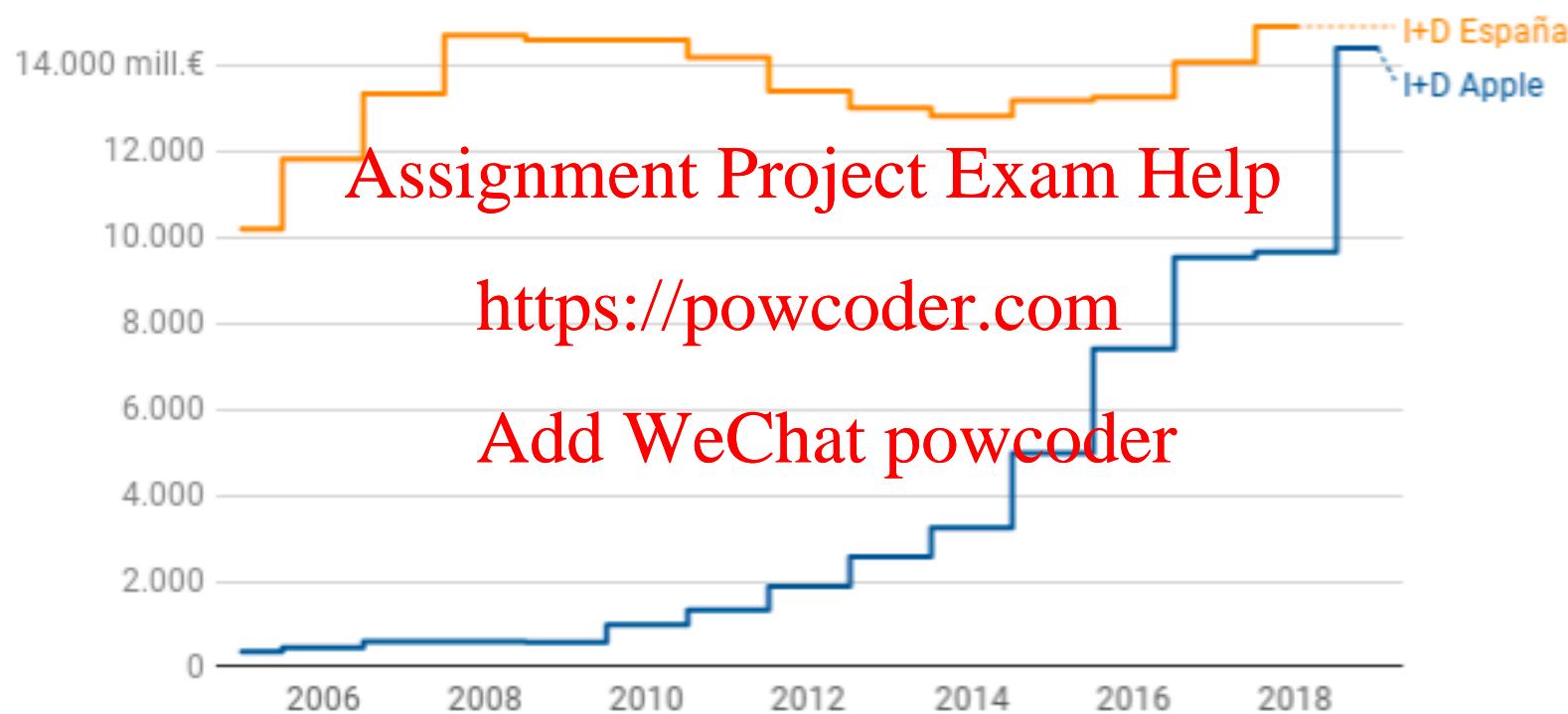
Source: Tractica

© FT

Source: <https://on.ft.com/2Hc6mcc>

EXPENDITURE ON R&D

ES (13TH LARGEST ECONOMY, 47 MILLION PEOPLE) VS APPLE INC. (€m)



* As of 2001, data includes continuous and occasional R&D | ** The data for Spain in 2018 are an estimate of the Cotec Foundation | *** 2019 Apple data is an estimate of Apple

• Source: National Statistics Institute (INE), European Commission - Created with Datawrapper

Companies Buy More Data to Build AI Systems

In 2012 tech startup CrowdFlower sold around 2 million spreadsheet rows of data to customers to use to train AI systems. This year it sold almost a hundred million.



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Source: CrowdFlower

Bloomberg

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Data + model → prediction
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Assume there is enough data to find statistical associations to solve specific tasks

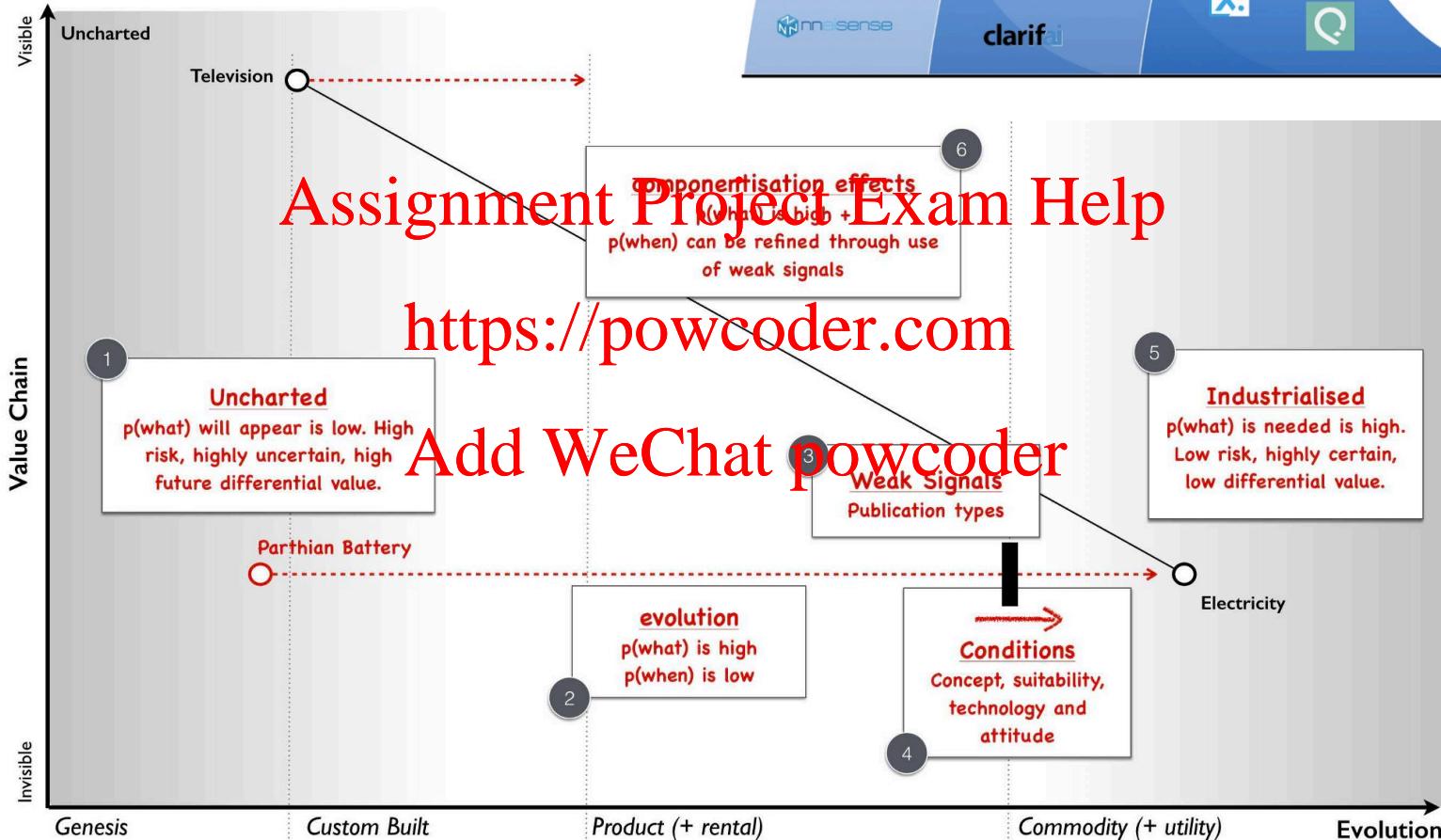
Assignment Project Exam Help

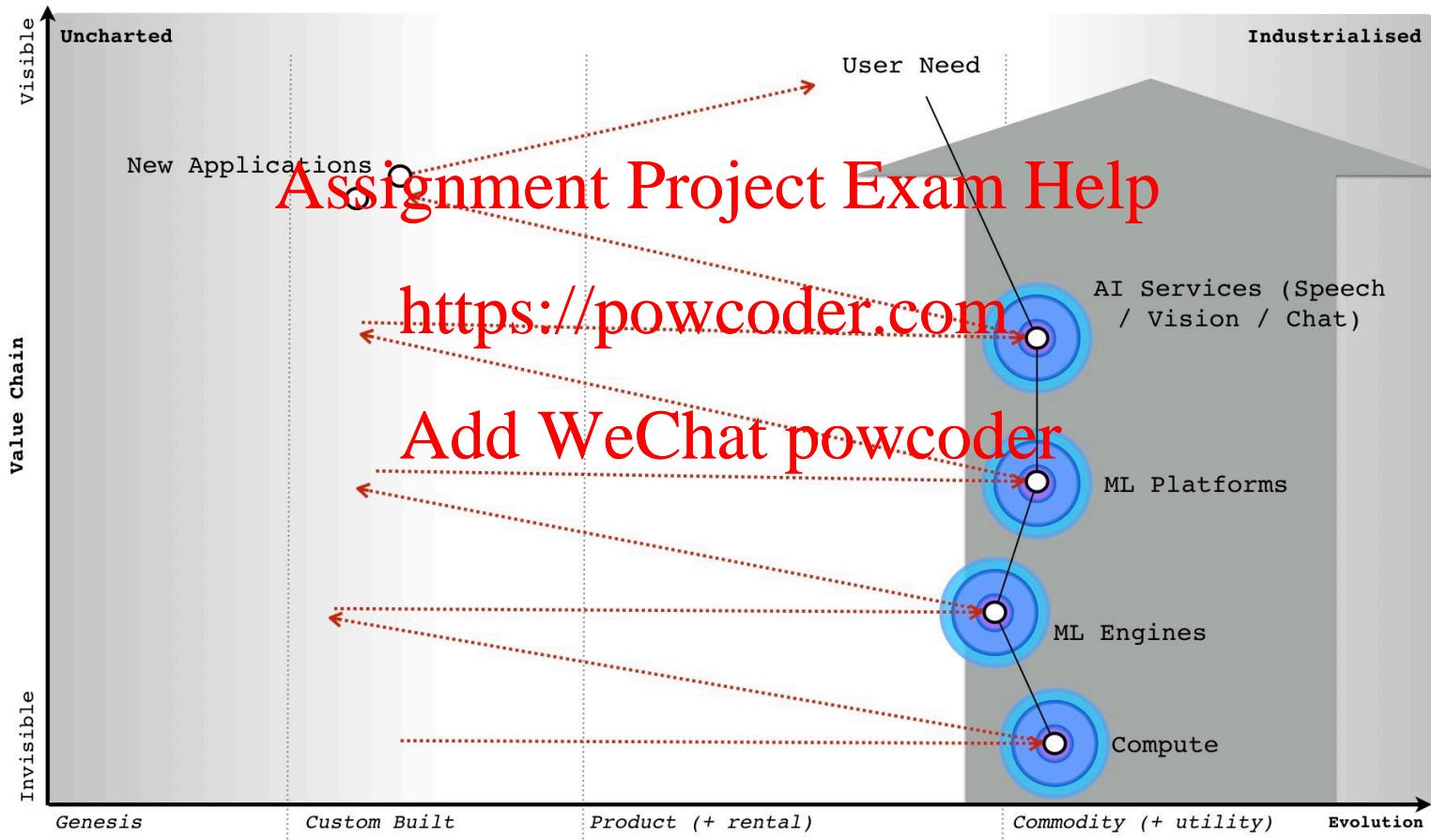
Data + model → prediction
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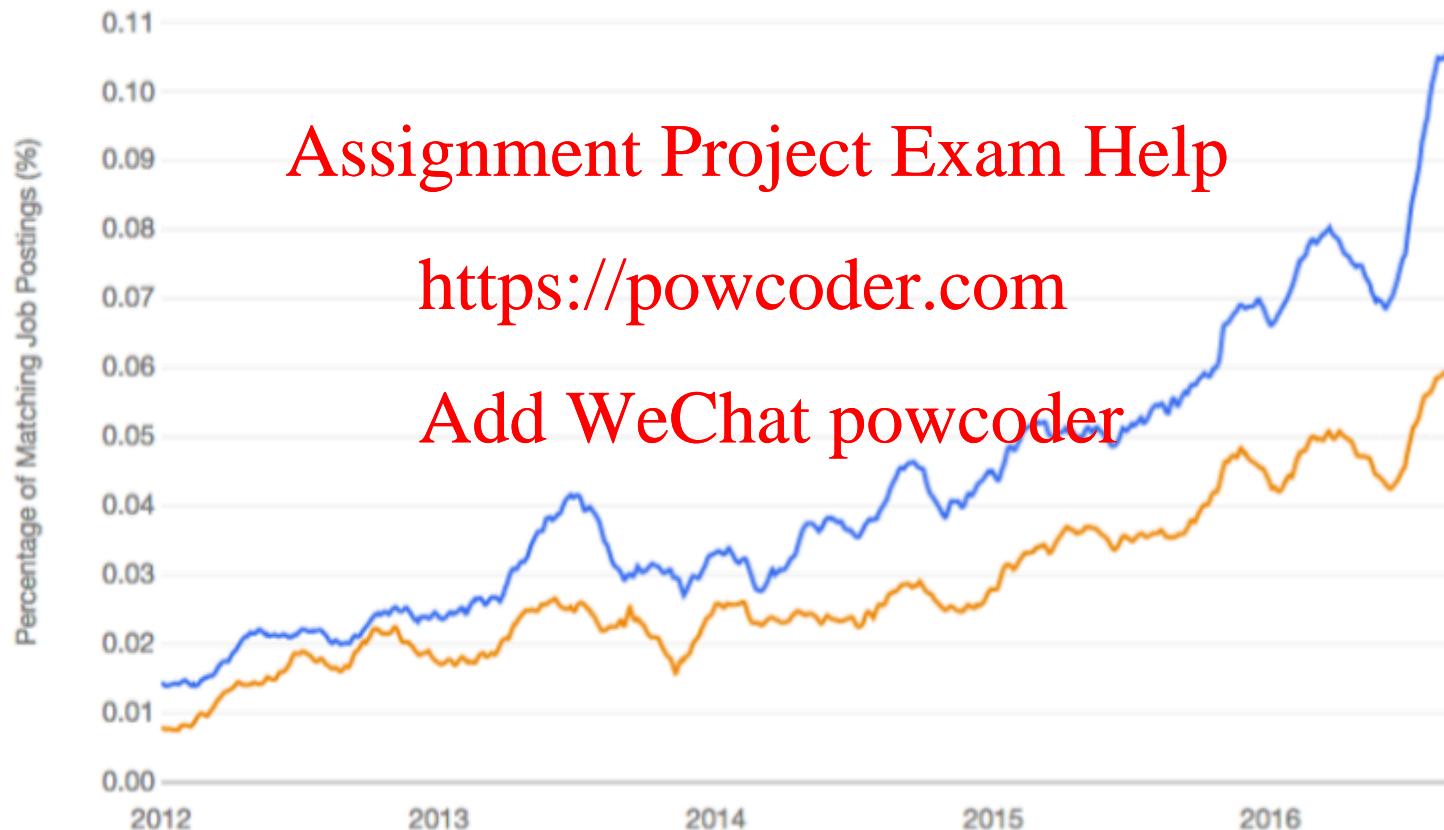
Define how well the model solves the task and adapt the parameters to maximize performance

WAVES OF INVESTMENT

THE ROLE OF INDUSTRIALIZATION







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NOT JUST CATS...



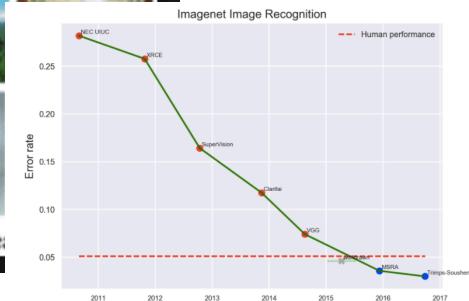
(a) ImageNet Synset: One sample image from each category

(b) Corel-1000 Dataset: Sample images from each category



(c) Caltech-256 Dataset: One sample image from each category

(d) Caltech-101 Dataset: One sample image from



CHIHUAHUA OR MUFFIN?

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Using ML in business
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-
- I. Increasing the number of customers
 - II. Serving customers better
 - III. Serving customers more efficiently

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INCREASING THE NUMBER OF CUSTOMERS

1. Reducing customer attrition ("churn")
2. Acquiring new customers

- i. Lead scoring
- ii. Optimizing marketing campaigns

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<https://powcoder.com>



-
- 3. Cross-selling products
 - 4. Optimizing products and pricing
 - 5. Increasing engagement

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-
- 6. Predicting demand
 - 7. Automating tasks

- 8. Making predictive applications

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- i. Prioritizing things
 - ii. Adapting workflows
 - iii. Optimizing configurations
- 9. Predictive maintenance

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Using ML in business functions
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<https://powcoder.com>
Horizontal applications

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MARKETING APPLICATIONS

Predicting
Lifetime Value
(LTV)

Wallet share
estimation

Churn

Customer
segmentation

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Product mix

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Cross selling
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Up-selling

Channel
optimization

Discount
targeting

Reactivation
likelihood

Adwords
optimization and
ad buying



RISK APPLICATIONS

Credit risk

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Treasury or
currency risk

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Fraud
detection

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Accounts
Payable
Recovery

powcoder
Anti-money
laundering



HUMAN RESOURCES APPLICATIONS

Resume
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screening

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Training
recommendation

Talent
management



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<https://powcoder.com>
Vertical applications
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HEALTHCARE APPLICATIONS

Claims review
prioritization

Medicare/medicaid
fraud detection

Medical resources
allocation

Alerting and
diagnostics from
real-time patient
data

Prescription
compliance

Physician attrition

Survival analysis

Medication
(dosage)
effectiveness

Readmission risk

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Price optimization

Location of new
stores

Product layout in
stores

Merchandizing

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Inventory
Management
(how many units)

Shrinkage analytics

Warranty
Analytics

Market Basket
Analysis

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Cannibalization
Analysis

Next Best Offer
Analysis

In store traffic
patterns



TRAVEL APPLICATIONS

Aircraft
scheduling

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Seat/gate
management
<https://powcoder.com>

Air crew
scheduling

Dynamic
pricing

Customer
complaint
resolution

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Maintenance
optimization

Tourism
forecasting



OTHER DOMAINS

Life Sciences

- Identifying biomarkers
- Drug/chemical discovery
- Analyzing study results
- Identifying negative responses
- Diagnostic test development
- Diagnostic targeting
- Predicting drug demand
- Prescription adherence
- Putative safety signals
- Social media marketing
- Image analysis
- Clinical trial design
- COGS optimization

Insurance

- Claims prediction
- Claims handling
- Price sensitivity
- Investments
- Agent & branch performance
- DM, product mix

Hospitality

- Dynamic pricing
- Promos/upgrades/offers
- Table management & reservations
- Workforce management

Manufacturing

- Failure analysis
- Quality management
- Inventory management
- Warranty/pricing

Direct Marketing

- Response rates
- Segmentations for mailings
- Risk/loss likelihood
- F&M
- Discount targeting
- Phone marketing
- Email Marketing

Construction

- Contractor performance
- Design issue prediction

Agriculture

- Yield management
- Automation

Mall Operators

- Tenant capacity to pay
- Tenant selection

Education

- Automated essay scoring
- Dynamic courses

Utilities

- Optimize Distribution Network
- Predict Commodity Requirements

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What do we do with data?
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