

Artificial Intelligence, Machine Learning, and Deep Neural Networks: What Does All of This Have to Do With Patent Analytics?



Srinivasan Parthiban



AI for Everyone

Across all Industries

Transportation



Healthcare



AlphaGoZero



Sophia-First Humanoid

"I know it's there, I just can't find it" – A findability Problem

Before Patenting



Thematic Database

Tuberculosis-Database

Reverse Informatics
The Art of Generating New Knowledge

Structure

Chemical structure of a compound: CN1C=NC2=C1S=C2c3ccccc3

Reference: Turan-Zhouan O., Eur J Med Chem. 2009 May;43(5):991-5

PubMed_Link: <http://pubmed.org/17719146>

PubMed_ID: 17719146

Given_Name: Compound 3a

SMILES: CN1C=NC2=C1S=C2c3ccccc3

EIPAC_Harris: N-(2-(R)-5-(4-(phenyl-4-yl)-N-(1-phenyl-ethyl)-ylidene)-hydroazine

Action_Type	Assay	Target_Human	Target_NonHuman	Conc	Conc_Uncertainty	IC50	ED50	ED90	ED95	EC50	EC90	EC95	ED50_Uncertainty	EC50_Uncertainty	EC90_Uncertainty	ED95_Uncertainty	EC95_Uncertainty
1	in vitro	Antimycobacterial activity	-	-	Mycobacterium smegmatis	m	-	-	-	MIC	>8.25	-	ug/ml	-	-	-	-
2	in vitro	Antimycobacterial activity	-	-	Mycobacterium smegmatis	m	8.25ug/mL	-	-	89	-	%	-	-	-	-	
3	in vitro	Cytotoxicity against C	-	-	NH2T23 cells	-	-	IC50	200	9.1	ug/ml	-	-	-	-	-	
4	in vitro	Cytotoxicity against C	-	-	NH2T23	400ug/mL	-	Toxicity	Non-toxic	-	-	-	-	-	-	-	

During Patenting



Patent Search Reports

SUMMARY

Patent Classification Areas Searched

SEARCH RESULTS

Text Search

The patent analyst conducted a text search using the search queries listed below. The analyst reviewed all documents resulting from search queries in boldface type.

1. MicroPatent – PatentWeb™

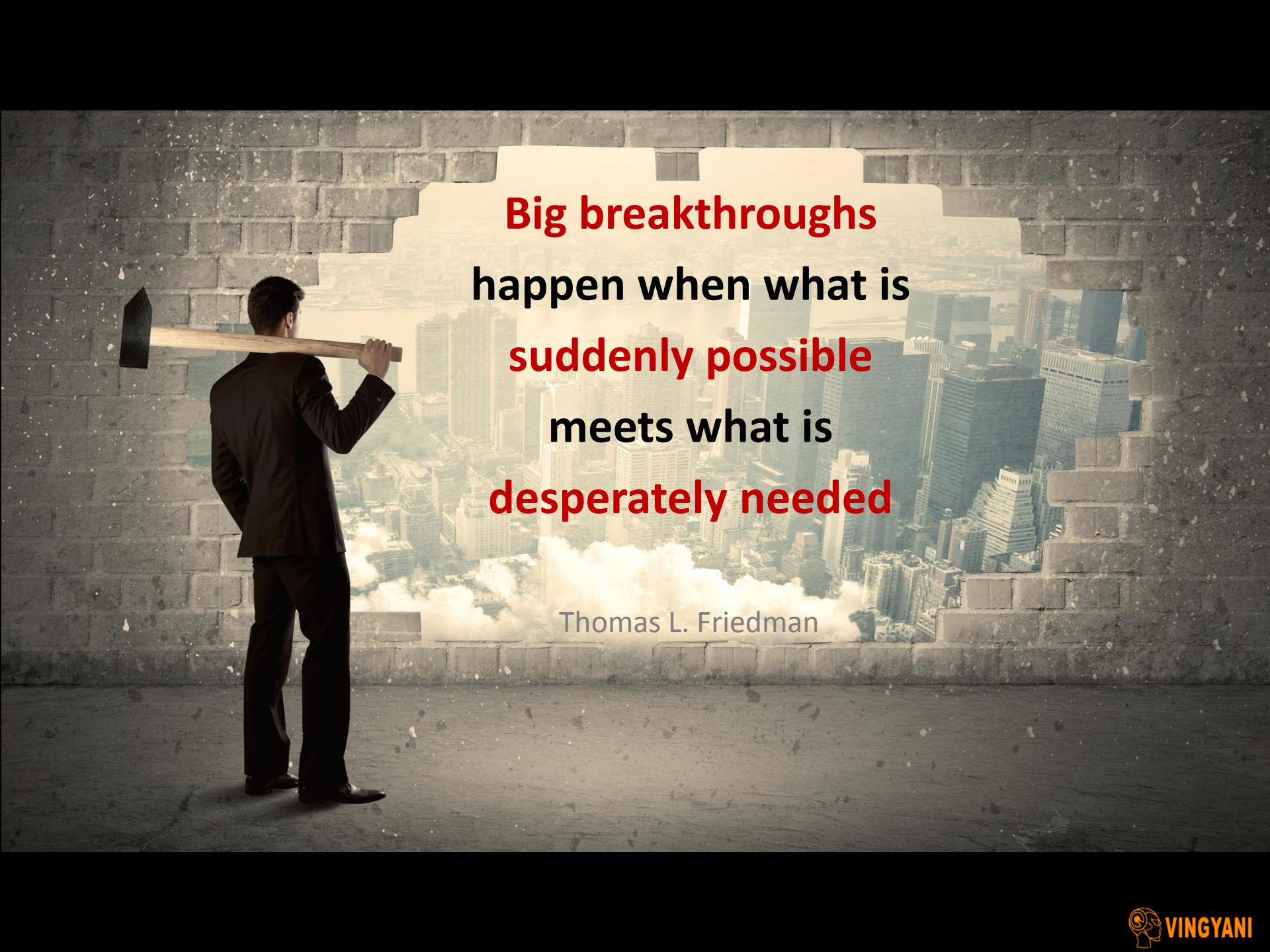
Hits	Search String
434	Search scope: US Granted US Applications; Full patent spec. Years: 1886-2007 Text: optic* and device* and electrode* and (semi-conduct* or semiconduct*) and polymer* and "charge carrier" Filing Date: <20020903
297	Search scope: US Granted US Applications; Full patent spec. Years: 1886-2007 Text: optic* and device* and electrode* and lay* and treat* and (semi-conduct* or semiconduct*) and polymer* and "charge carrier" Filing Date: <20020903
89	Search scope: US Granted US Applications; Full patent spec. Years: 1886-2007 Text: "optical device" and electrode* and (semi-conduct* or semiconduct*) and "charge carrier" Filing Date: <20020903

After Patenting



Patent Analysis, Claim Chart Maps, Licensing in/out opportunities





**Big breakthroughs
happen when what is
suddenly possible
meets what is
desperately needed**

Thomas L. Friedman

The Beginning of the AI Revolution in Patent Analytics

GOVINSIDER

CONNECTED DIGITAL INCLUSIVE INNOVATION SECURITY SMART EVENTS ABOUT

SIGN UP FOR DAILY BRIEF

Search GovInsider

Japan to use AI in patent screening

The technology will help to automate "cumbersome" tasks such as literature reviews.

By Nurfilzah Rohaidi
24 APR 2017
DIGITAL GOV

April 2017



The Japan Patent Office is planning on using artificial intelligence in the processing of patents, it was reported.



January 2017

ROBOT FILES PATENT

Published on January 19, 2017

Greg Sach + Follow
Experienced UK and European patent attorney ready to work with yo...
64 11 13

FIRST AUTOMATED EPO REGIONAL PHASE ENTRY



Photo by delfi de la Rua on Unsplash

Deep Learning AI for Patent Search and Analytics

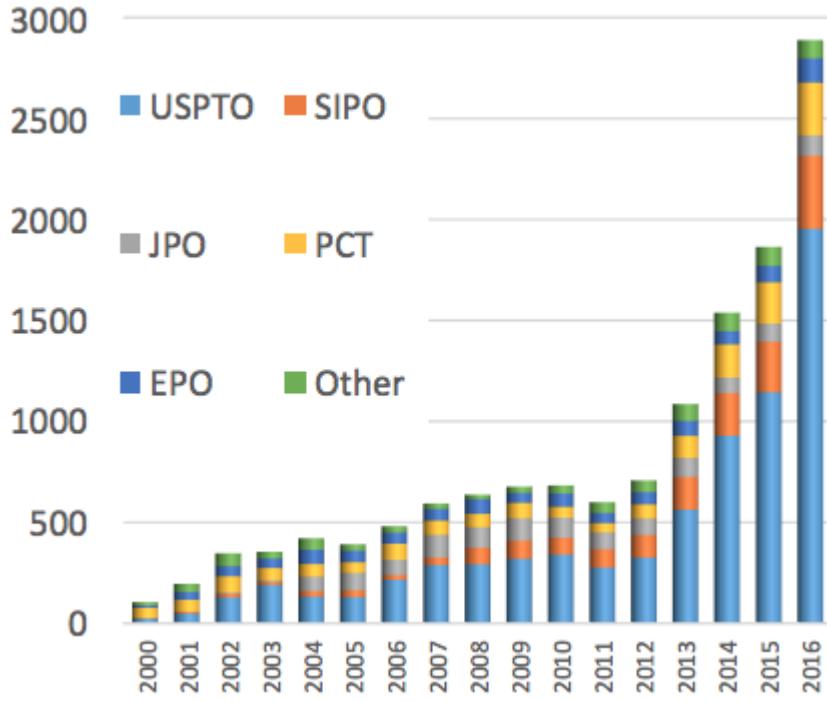
Published on May 28, 2017

Sumeet Sandhu ✓ Following
CEO, co-founder
1 article
97 6 8

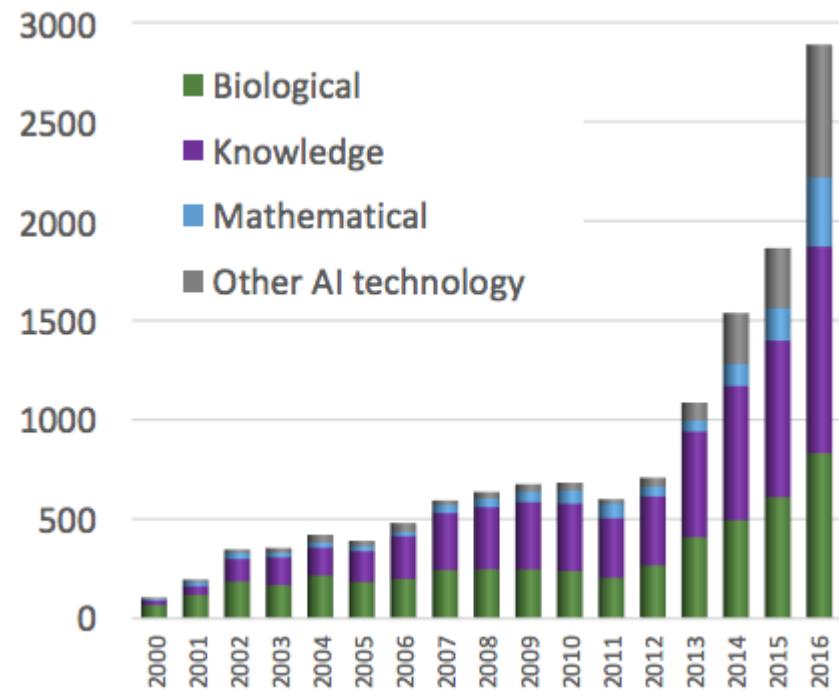
A fundamental pain point for patent search, or any search, is figuring out what keywords to search with. You don't know what you don't know! How do you find your way to the right answer?

May 2017

Trend of AI patents granted, 2000 to 2016 (number of items)



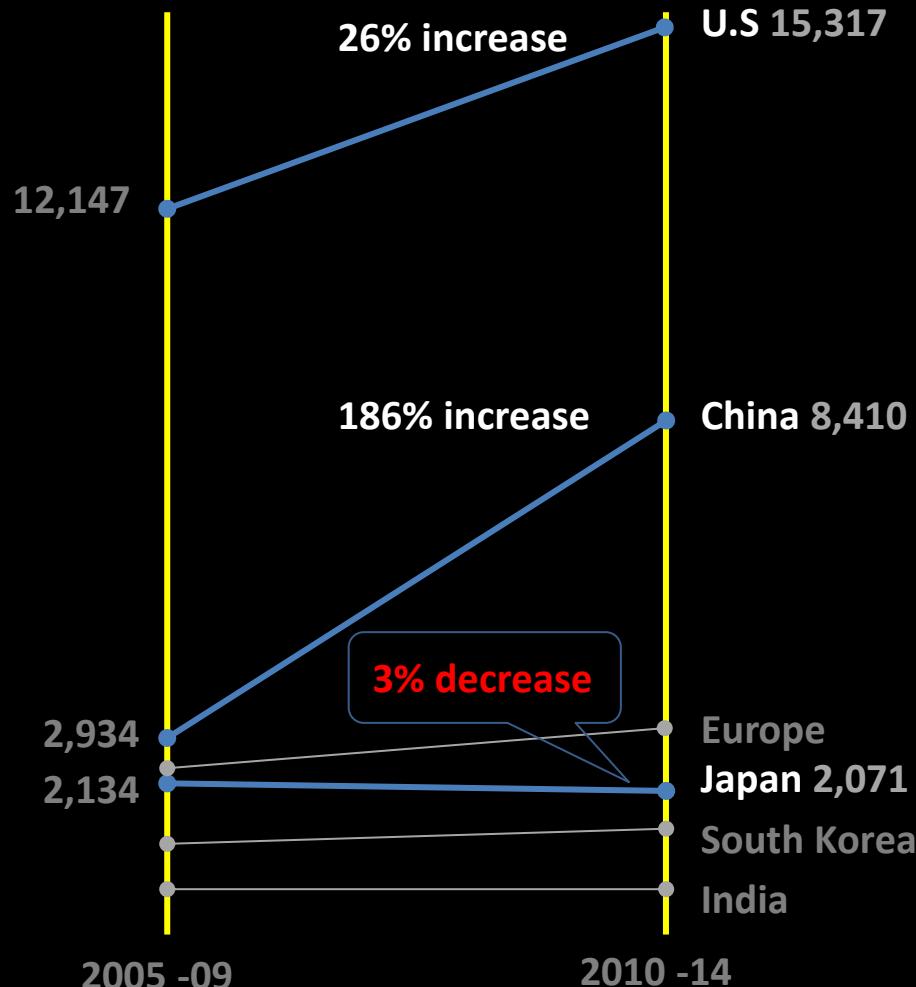
Number of AI patents granted by country



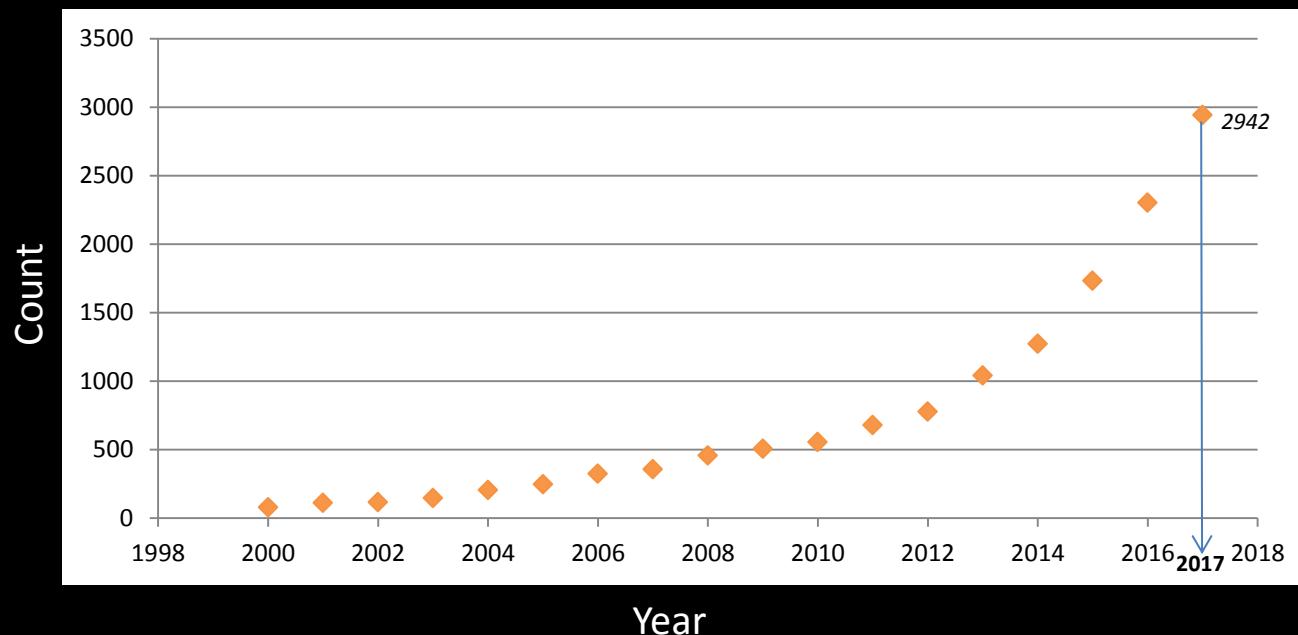
Number of AI patents granted by technology

USPTO: United States Patent and Trademark Office; SIPO: State Intellectual Property Office of The People's Republic of China;
JPO: Japan Patent Office; PCT: Patent Cooperation Treaty; EPO: European Patent Office

AI Patent Applications



The Rise of AI in PubMed



*PubMed Search (17/10/2017): artificial intelligence/
machine learning/ deep learning (**titles and abstracts only**)*

Top 4 (out of 8) Trends from PIUG 2017



By: Devin Salmon, Patent Analyst, IP.com

- **Deep learning and neural networking is the next big thing.** In the patent space, it is being used in many ways including improved translations, classification, and search.
- **Not all semantic engines are the same.** Ask yourself: are they statistical models, **artificial intelligence, neural networks**, document signatures, **deep learning**, or a combination? How are they trained/tuned to assist with retrieval of patent data?
- The big question is how do we as humans fit into patent analysis with the newer technologies available? Currently, **the best practice appears to be a mix of machine learning and guidance from a human.**
- **Not all translations are equal.** There are old versions that were direct word-for-word translations, newer sentence based, and **neural networks**. Questions around how translation affects the terminology used to describe new inventions still remains.

The Next 4 Trends from PIUG 2017



By: Devin Salmon, Patent Analyst, IP.com

- **Clean data is king:** every tool ends up having essentially the same data from all the patent offices. How they extract it, clean it up, and what additional features are added are going to be the keys to searching and using newer analytics tools.
- **Determining the “correct” assignee is still a major problem.** Furthermore, how do we define “correct.”
- Typical visualizations can be broken into two groups: those used for explanation and those used for exploration. **The future lies in the creation of visualization tools that can be used to make decisions.**
- Tools for classification, subject grouping, and tagging have room for improvement and future versions should likely capitalize on the use of machines either to augment or replace a human.

Analytic Tools



Derwent Innovation

Smart Search



KMX
Patent
Analytics &
Visualization



Thomson Data Analyzer
Biz-Int solutions (smart-charts)



DUNE





Cognitive Science

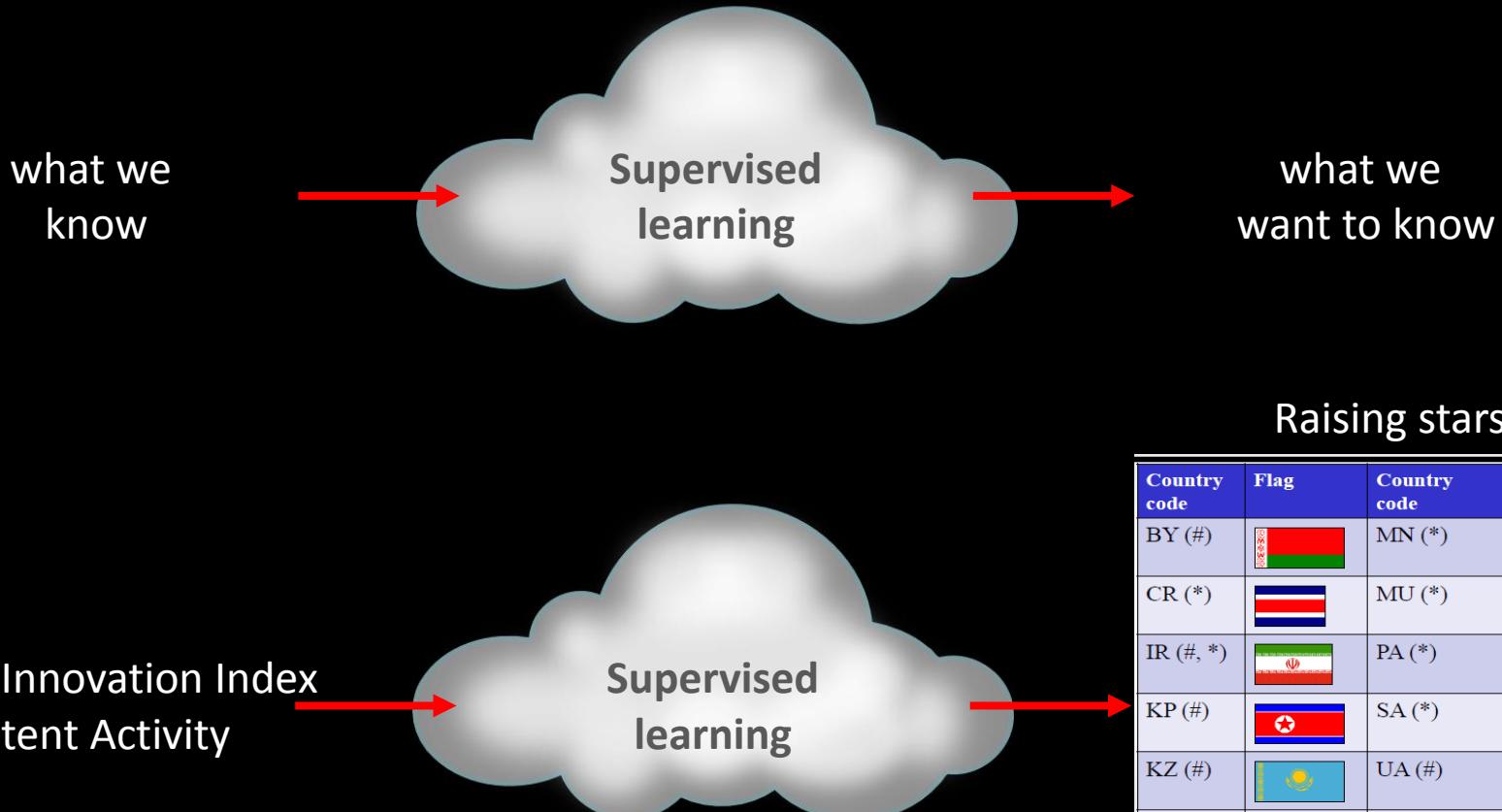
**Artificial
Intelligence**

**Machine
Learning**

**Deep
Learning**

Supervised Learning

Transforms One Dataset into Another

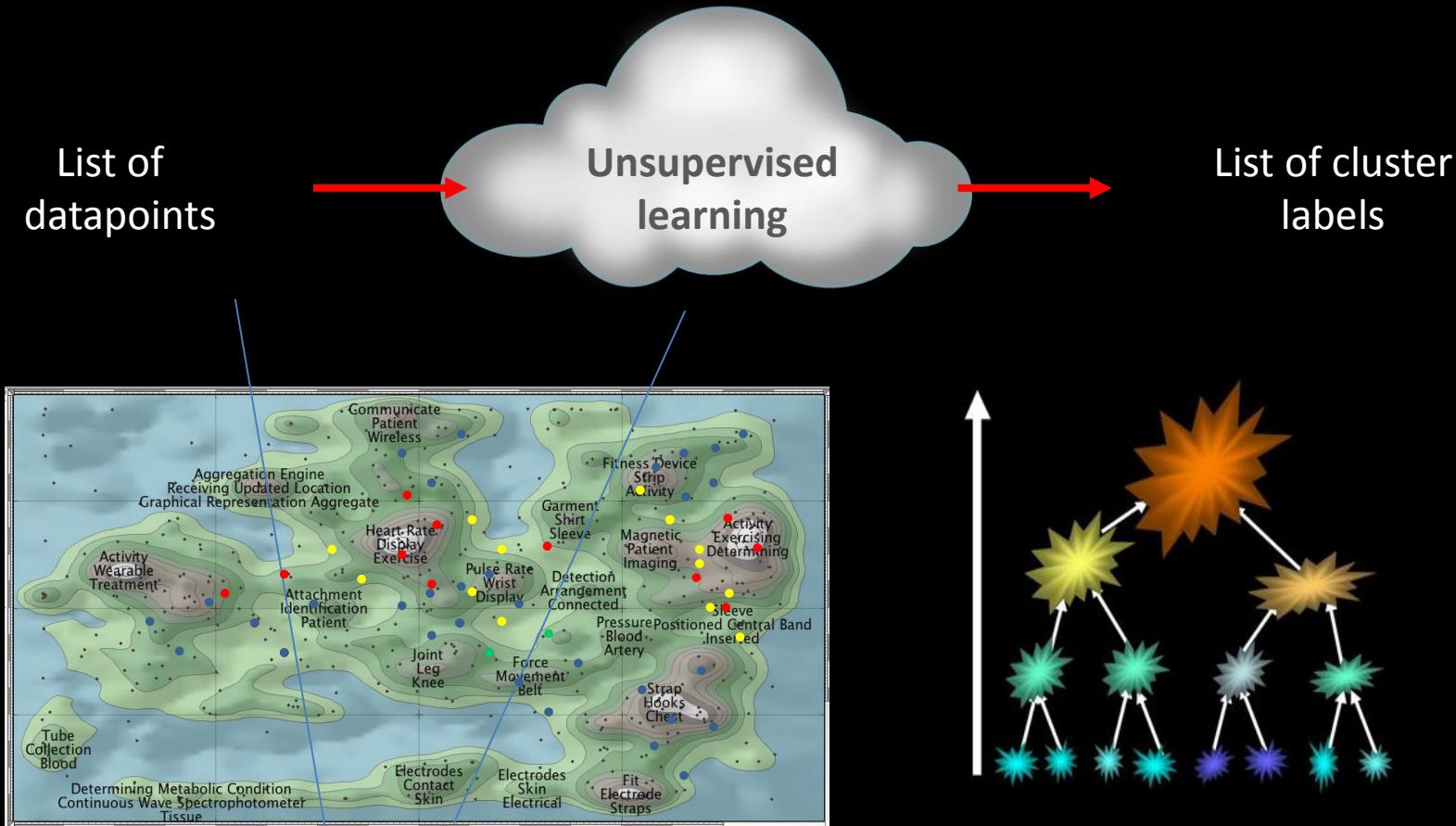


Thanks

Stephan Adams, Magister
PIUG 2017 Workshop

Unsupervised Learning

Groups your data



K-means clustering

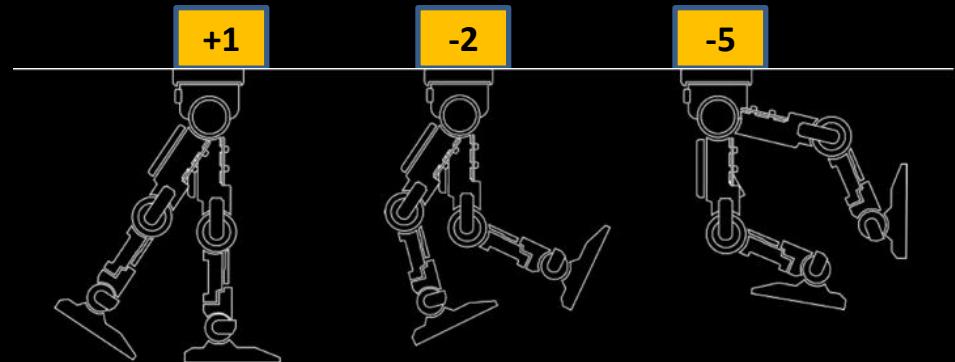
Hierarchical Clustering

Reinforcement Learning

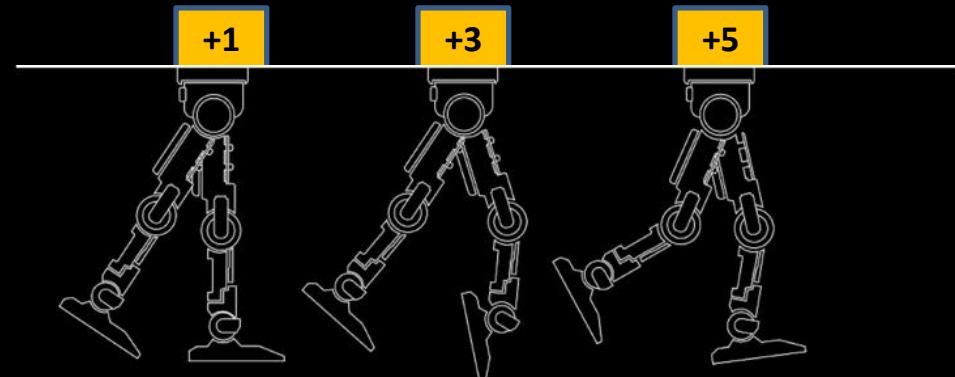
$$R = \sum_{t=0}^{\infty} \gamma^t r_{t+1} \quad f(\beta) := \frac{1}{N} \sum_{i=1}^N L(\beta; (x_i, y_i)) + R(\beta)$$

Use Math to Represent the Goal of Walking

Receive a Score for Each Move



Experiment with Different Moves



Interacting with the Environment

averbis approach in a Nutshell

Automatic Patent Categorization

1

Define Categories

2

Provide Examples & Train

3

Let the System Categorize
Documents

4

Review Results

*Active
Learning*

GO



Define Categories

Search *Technology-Demo*

0

1530 results found

Status: Unknown (1530)

Sort by: Last Update (descending) | Page size: 10

Check All Label Documents

ADDITIVE MANUFACTURING US2014034626

Applicant: MATERIALS SOLUTIONS CPC Codes: B23K26/34 (14) Publication Date: 02/06/2014 Priority Date: 08/06/2012

Additive-Manufacturing

Advanced-Manufacturing

Bitcoin

Predictive-Maintenance

+ Create new label

Abstract:
acting on a powder layer in a working zone, containing a device for layering said powder, said device including: means for storing powder, means for distributing powder that travel over the working zone to distribute powder in a layer having a final thickness for additive manufacturing, feeding means that transfer powder from storage means to distributing means, metering means that control the quantity of powder transferred from storage means to distributing means, said machine being wherein: storage means are positioned higher than the working zone, feeding means utilize gravity, feeding means and the metering means move with the distributing means, the machine has two separate working zones and two separate working trays that move independently of one another, each of the working trays is associated with only one working zone, and the layering device is common to both working zones.

Provide Examples

Search Technology-Demo

0

1530 results found

Status

Unknown 1530

Check All Label Documents

Classify Export search results

Sort by Last Update (descending)

Page size 10

Applicant: MATERIALS SOLUTIONS

Abstract: Methods of additive manufacturing focused laser beam in a method a compressive method a superalloy co substrate is reduced pri

+

ADDITIVE MANUFACTURING

Applicant: MATERIALS SOLUTIONS

Abstract: Methods of additive manufacturing focused laser beam in a method a compressive method a superalloy co substrate is reduced pri

+

Advanced-Manufacturing

Bitcoin

Predictive-Maintenance

Save Cancel

Label Selected Documents

Machine and N

Michelin and CIE

Abstract: acting on a powder layer in a working zone, containing a device for layering said powder, said device including: means for storing powder, means for distributing powder that travel over the working zone to distribute powder in a layer having a final thickness for additive manufacturing, feeding means that transfer powder from storage means to distributing means, metering means that control the quantity of powder transferred from storage means to distributing means, said machine being wherein: storage means are positioned higher than the working zone, feeding means utilize gravity, feeding means and the metering means move with the distributing means, the machine has two separate working zones and two separate working trays that move independently of one another, each of the working trays is associated with only one working zone, and the layering device is common to both working zones.

Train the System

Search Technology-Demo

Category: 1530 results found

Status: Sort by Last Update (descending) Page size 10

Check All Label Document Train Classify Export search results

Accuracy: 91.7%

LAYER TRANSFUSION WITH ROTATABLE BELT FOR ADDITIVE MANUFACTURING

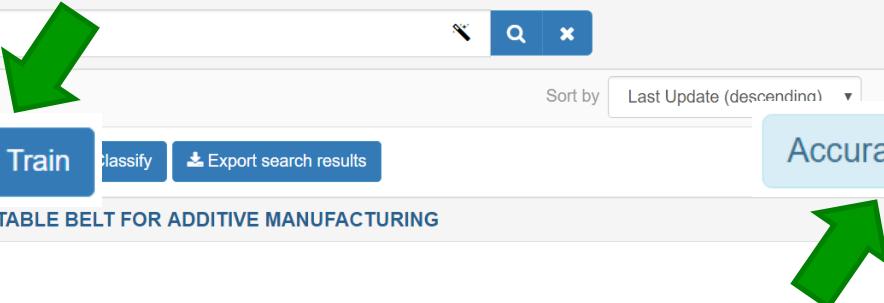
Applicant: STRATASYS INC CPC Codes: G03G15/224 Publication Date: 03/28/2013 Priority Date: 09/21/2012

Abstract:
An additive manufacturing system comprising a transfer medium configured to receive the layers from a imaging engine, a heater configured to heat the layers on the transfer medium, and a layer transfusion assembly that includes a build platform, and is configured to transfuse the heated layers onto the build platform in a layer-by-layer manner to print a three-dimensional part.

METHODS FOR MANUFACTURING COMPONENTS FROM ARTICLES FORMED BY ADDITIVE-MANUFACTURING P

Applicant: MÖRRIS MARK C CPC Codes: C23C26/00 Publication Date: 03/21/2013 Priority Date: 09/16/2011

Abstract:
A method is provided for manufacturing a component. The method includes forming a diffusion coating on a first intermediate article formed by an additive manufacturing process. The diffusion coating is removed from the first intermediate article forming a second intermediate article having at least one enhanced surface. The diffusion coating is formed by applying a layer of coating material on at least one surface of the first intermediate article and diffusion heat treating the first intermediate article and the layer. The diffusion coating comprises a surface additive layer and a diffusion layer below the surface additive layer. The formation of the diffusion coating and removal thereof may be repeated at least once.



Categorize Patents

Search Technology-Demo

Category: 1450 results found

Status: Auto-Classified

Sort by: Last Update (descending)

Page size: 10

Accuracy: 91.7%

Confidence: Low → High

Classify

REAL-TIME ROBOTIC GRASP PLANNING

Advanced-Manufacturing

Applicant: GM GLOBAL TECH OPERATIONS INC

CPC Codes: B25J9/1669 1

Publication Date: 12/24/2015

Priority Date: 06/20/2014

Abstract:

A method of determining an optimal grasp pose of an object by an end-effector of a robot in the execution of a task includes receiving a set of inputs via a controller, including a descriptive parameter of the object, a task wrench having a frame of reference, and a commanded end-effector grasp force. The method includes calculating a grasp wrench in the frame of reference of the task wrench, rotating and shifting the grasp pose, and then computing a resultant new grasp wrench via the controller until the task wrench and the grasp wrench are optimally balanced. Additionally, the method includes recording the optimal grasp pose as the grasp pose at which the grasp and task wrenches are optimally balanced, and then executing a control action via the controller using the recorded optimal grasp pose. A robotic system includes the robot and a controller programmed to execute the method.

ROBOT CONTROL DEVICE PROVIDED WITH FUNCTION OF REFLECTING POINTS OF DIFFERENCE OF SET ...

Advanced-Manufacturing

Applicant: FANUC CORP

CPC Codes: B25J13/06 3

Publication Date: 12/10/2015

Priority Date: 06/10/2014

Abstract:

A robot control device which can exchange data with a plurality of robot control devices and with a storage medium which stores setting data of the robot control device, which robot control device can compare setting data which is set at a specific robot control device and setting data which is set at another robot control device and setting data which is stored in the storage medium, at least two, for each item, display items with differences between the compared setting data, and reflect that selected setting data.

Active Learning

Search Technology-Demo

Category: 1450 results found

Status: Auto-Classified

Sort by: Last Update (descending)

Page size: 10

Accuracy: 91.7%

REAL-TIME ROBOTIC GRASP PLANNING

Advanced-Manufacturing

Applicant: GM GLOBAL TECH OPERATIONS INC

CPC Codes: B25J9/1669

Publication Date: 12/24/2015

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Abstract:

A method of determining an optimal grasp pose of an object by an end-effector of a robot in the execution of a task includes receiving a set of inputs via a controller, including a descriptive parameter of the object, a task wrench having a frame of reference, and a commanded end-effector grasp force. The method includes calculating a grasp wrench in the frame of reference of the task wrench, rotating and shifting the grasp pose, and then computing a resultant new grasp wrench via the controller until the task wrench and the grasp wrench are optimally balanced. Additionally, the method includes recording the optimal grasp pose as the grasp pose at which the grasp and task wrenches are optimally balanced, and then executing a control action via the controller using the recorded optimal grasp pose. A robotic system includes the robot and a controller programmed to execute the method.

ROBOT CONTROL DEVICE PROVIDED WITH FUNCTION OF REFLECTING POINTS OF DIFFERENCE OF SET ...

Predictive-Maintenance

available

Additive-Manufacturing

Advanced-Manufacturing

Bitcoin

Rest

classified

Predictive-Maintenance



Active Learning

Search Technology-Demo

Category: 1450 results found

Status: All Classified

Sort by: Last Update (descending)

Page size: 10

Accuracy: 95.0%

US2015367514

REAL-TIME ROBOTIC GRASP PLANNING

Advanced-Manufacturing

Applicant: GM GLOBAL TECH OPERATIONS INC

CPC Codes: B25J9/1669

Publication Date: 12/24/2015

Priority Date: 06/20/2014

Abstract:

A method of determining an optimal grasp pose of an object by an end-effector of a robot in the execution of a task includes receiving a set of inputs via a controller, including a descriptive parameter of the object, a task wrench having a frame of reference, and a commanded end-effector grasp force. The method includes calculating a grasp wrench in the frame of reference of the task wrench, rotating and shifting the grasp pose, and then computing a resultant new grasp wrench via the controller until the task wrench and the grasp wrench are optimally balanced. Additionally, the method includes recording the optimal grasp pose as the grasp pose at which the grasp and task wrenches are optimally balanced, and then executing a control action via the controller using the recorded optimal grasp pose. A robotic system includes the robot and a controller programmed to execute the method.

ROBOT CONTROL DEVICE PROVIDED WITH FUNCTION OF REFLECTING POINTS OF DIFFERENCE OF SET ...

Predictive-Maintenance

available

Additive-Manufacturing

Advanced-Manufacturing

Bitcoin

Rest

classified

Predictive-Maintenance

US2015352724

with a plurality of robot control devices and with a storage medium which stores setting data of the robot compare setting data which is set at a specific robot control device and setting data which is set at another robot in the storage medium, at least two, for each item, display items with differences between the compared data.

VINGYANI

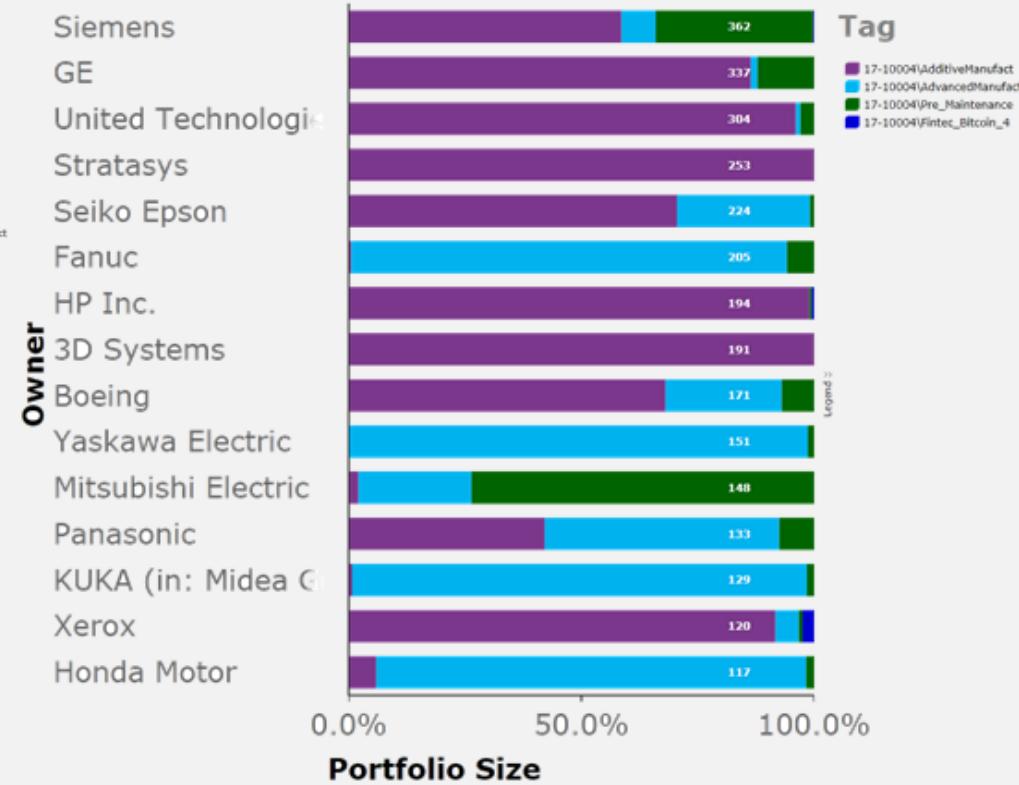
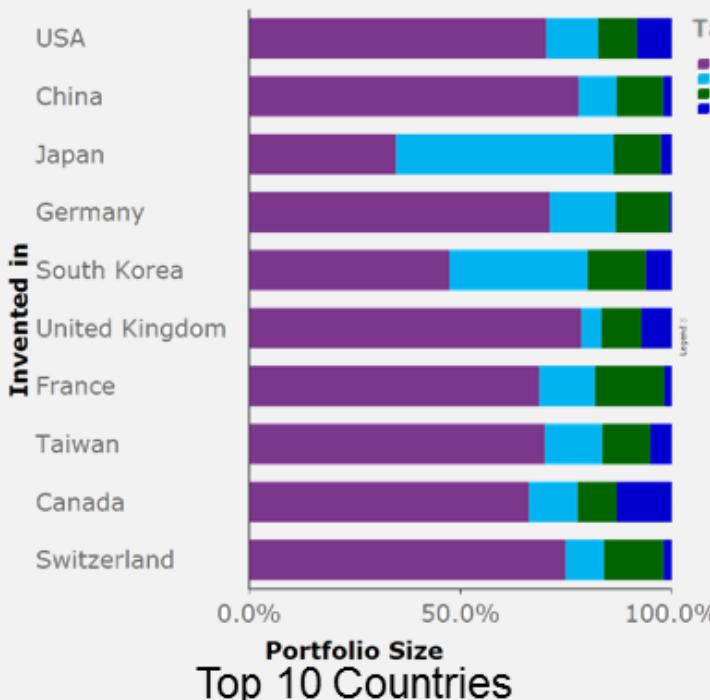
Advanced Technology Fields Chosen as Examples for **Active Monitoring**

Advanced Manufacturing

Additive Manufacturing

Predictive / Preventive Maintenance

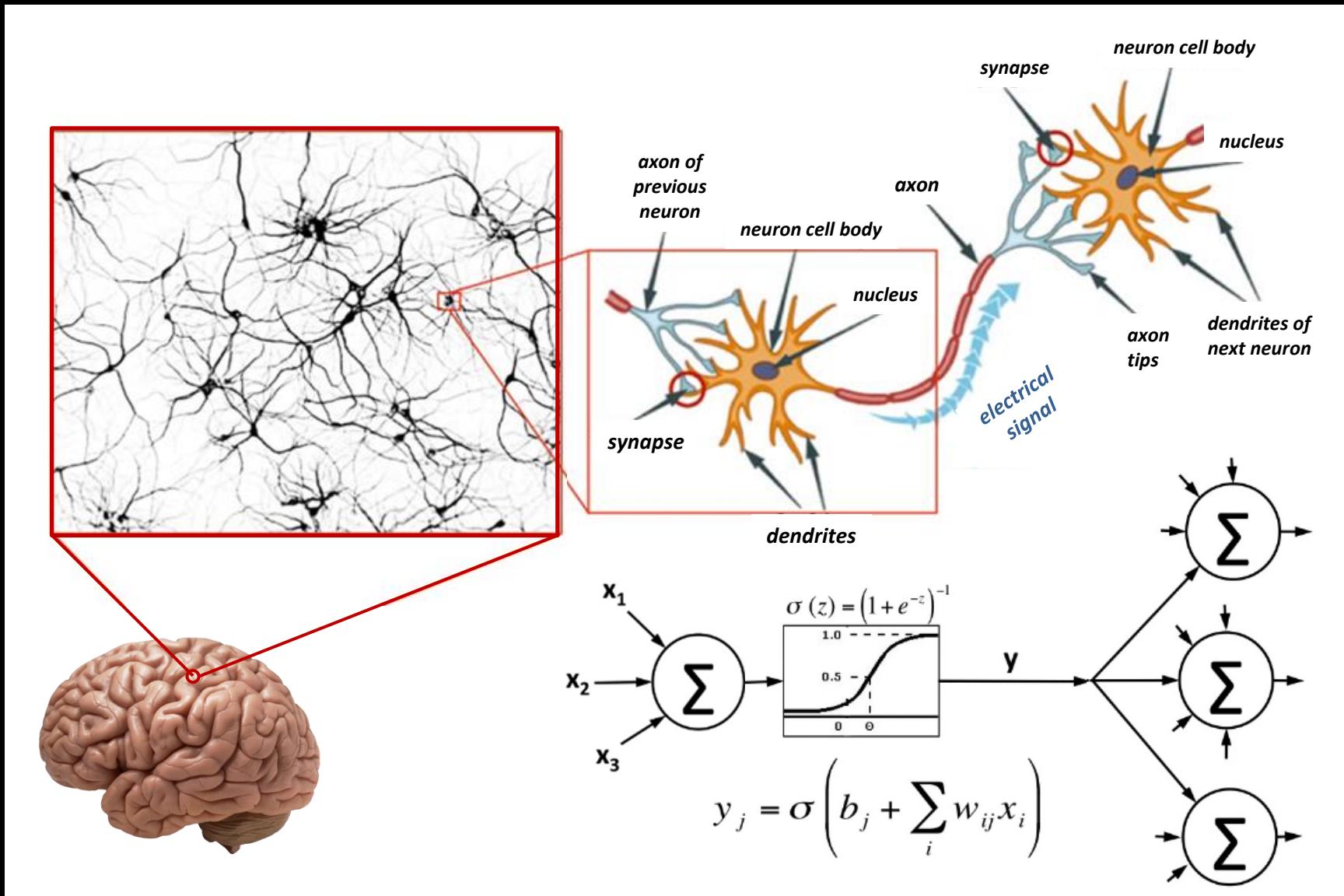
Bitcoin



Top 10 Countries

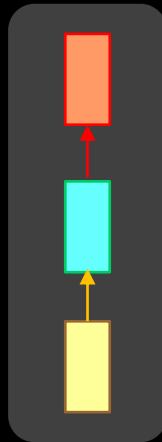
Top15 Player for the 4 technologies

Neurons and the Brain

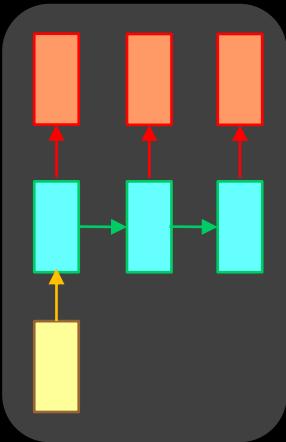


Design Patterns for Recurrent Neural Network

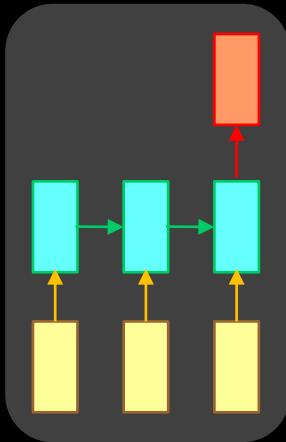
one to one



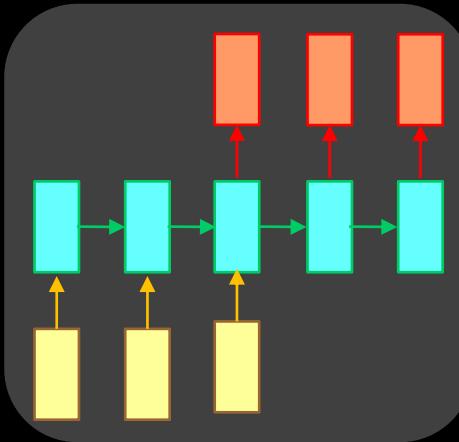
one to many



many to one



many to many



many to many

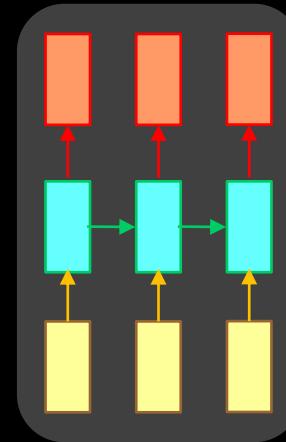


Image classification

Cat



Image captioning

Selling coconut and oil lamps on the street



Sentiment analysis

II-PIC Conference 2017 in Bangalore is absolutely a great event



Machine translation

Yegitheera Channagithini
How are you Am fine

Classify image frame by frame



Patent Translation And Machine Learning



Thanks

Nigel Clarke, European Patent Office

PIUG 2017 Workshop

Patent Translate



The EPO and Google have worked together to bring you a machine translation service specifically for use with patent documents.

Inventor(s): CHANG TSE-WEN; HUNG ALFUR FU-HSIN; LU DONIC CHIEN-SHENG

Applicant(s): IMMUNWORK INC ±

Classification:

- international: A61K39/395; A61P37/00; C07K16/00; C07K16/42
- cooperative: C07K14/395; C07K16/4283; A61K2039/505; C07K2317/56; C07K2317/565; C07K2317/73; C07K2319/03; C07K2319/30; C07K2319/73

Application number: CN2014866447 20141205 ⓘ Global Dossier

Priority number(s): US201361912395P 20131205 ; WO2014CN01097 20141205

Also published as: EP3077000 (A1) Ⓜ JP2017501997 (A) Ⓜ TW201609815 (A) Ⓜ US

Abstract of CN106029092 (A)

Translate this text into powered by EPO and Google

Disclosed herein is an anti-migis-alpha antibody specific for the migis- α of human m alpha lymphocytes, cause the lysis of IgA-expressing B lymphocytes, and decrease IgA production. It further is a pharmaceutical composition comprising the anti-migis- α antibody and a pharm. further is a method for lysing IgA-expressing B lymphocytes and reducing IgA production in a antibody specific for the migis- α of human m alpha chain that can bind to IgA on B lymph lymphocytes, and decrease IgA production by IgA-secreting B lymphocytes. Disclosed herein is subject, comprising administering to the subject an antibody specific for the migis- α of human lymphocytes, thereby lysing IgA-expressing B lymphocytes and reducing IgA production in the lymphocytes. Disclosed also is use of said anti-migis- α antibody or said fragment thereof for treating a disease elimination of IgA-expressing cells or the reduction of IgA antibodies in the immune system.

Patent Translate

The **Patent Translate** feature provides machine translations of abstracts, claims and descriptions from English, French and German into any of the 28 official languages of the EPO's 38 member states, and vice versa, plus from Chinese, Japanese, Korean and Russian into English, and vice versa.

Patent Translate is a machine translation service which has been specially "trained" to handle elaborate patent vocabulary and grammar. **Patent Translate** takes a statistical approach, comparing the source document sentence by sentence with millions of patent documents previously translated by human translators.

! Please note that the translations provided by **Patent Translate** are not legally binding. They are intended to give you the gist of a patent or patent-related document, and to help you determine whether it is relevant.

If you want to read the text of abstracts, descriptions and claims in another language, you can either follow the links to the original documents of the patent family members or use the **Patent Translate** feature.

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Patent Translate

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要約書 CN106029092

本発明は、Bリンパ球上のmlgAに結合し、mlgA發現Bリンパ球の溶解を引き起こし、IgA分泌Bリンパ球によるIgA産生を減少させることができるヒトmgf遺伝子の遊走cDNA特異的な抗原性を持つ抗体を示す。さらに、抗マーキングス抗体および薬学的に許容される組合を含む医薬組成物が開示される。さらに開示されているのは、mlgAを發現するBリンパ球を溶解させ、Bリンパ球上のmlgAに結合することができるヒトmgf遺伝子の遊走cDNA特異的な抗体を使用することにより、インビボでヒト細胞においてIgA産生を低下させる方法であって、IgA分泌Bリンパ球によるIgA産生を減少させることができた。本明細書には、Bリンパ球上のmlgAに結合することができるヒトアルファ鎖の遊走cDNA特異的な抗体を被膜細胞に投与することにより、mlgA發現Bリンパ球を溶解し、被膜細胞の免疫系におけるIgA産生が阻害されることが示された。

さらに、mlgA發現細胞の排除または免疫系におけるIgA抗体の減少の恩恵を受けることができる被膜細胞の疾患を治療するための前記抗マーキングス抗体またはその断片の使用も開示される。

🖨 Print
PDF (only translation)
PDF (original and translation)

Please help us to improve the translation quality.

Your opinion on this translation:

- Human translation
- Very good
- Good
- Acceptable
- Rather bad
- Very bad

Your reason for this translation:

- Patent application
- Patent search
- Patent examination

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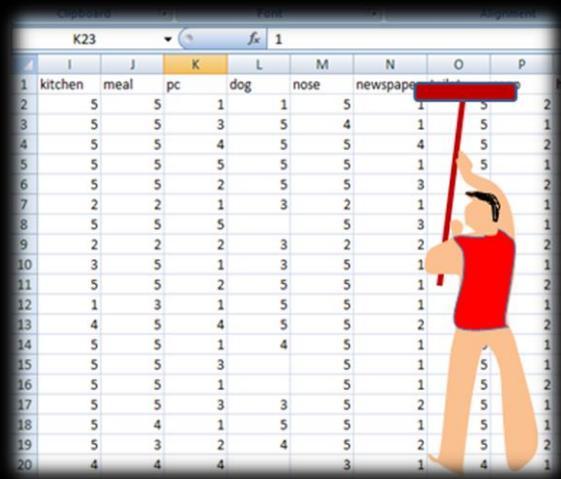
Next Step:
Neural Networks
For
Patent Translation

Research on Patent Document Classification Based on Deep Learning

Bing Xia, Baoan LI* and Xueqiang Lv

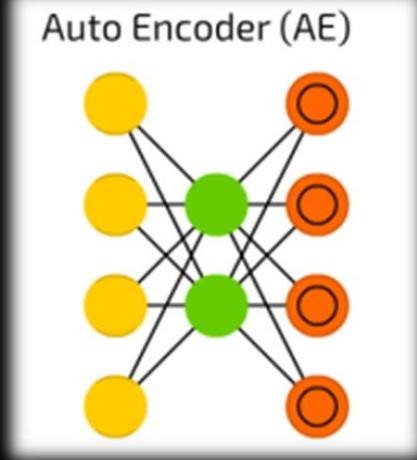
Advances in Intelligent Systems Research, volume 133 (AIIE2016)

Patent Document –
Preprocessing



I	J	K	L	M	N	O	P
1	kitchen	meal	pc	dog	nose	newspaper	table
2	5	5	1	1	5	1	5
3	5	5	3	5	4	1	5
4	5	5	4	5	5	4	5
5	5	5	5	5	5	1	5
6	5	5	2	5	5	3	2
7	2	2	1	3	2	1	1
8	5	5	5		5	3	1
9	2	2	2	3	2	2	2
10	3	5	1	3	5	1	1
11	5	5	2	5	5	1	2
12	1	3	1	5	5	1	1
13	4	5	4	5	5	2	2
14	5	5	1	4	5	1	1
15	5	5	3		5	1	5
16	5	5	1		5	1	5
17	5	5	3	3	5	2	5
18	5	4	1	5	5	1	5
19	5	3	2	4	5	2	5
20	4	4	4		3	1	4

Feature Learning
With AutoEncoder



Classification using
SoftMax Regression



Guidelines for Preparing Patent Landscape Reports

Guidelines prepared
for the

World Intellectual Property Organization (WIPO)

by Anthony Tripp,
Patinformatics, LLC

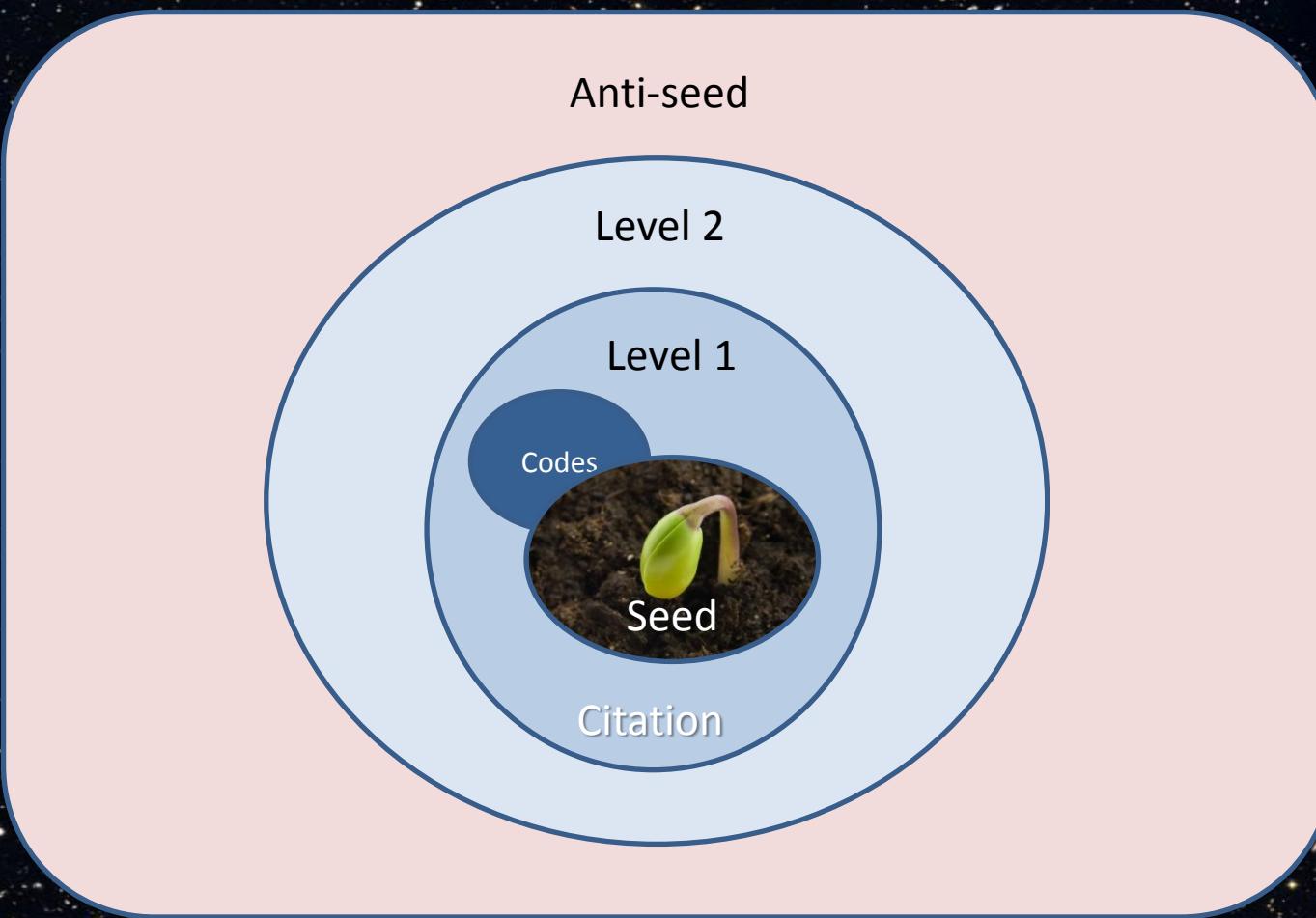
With contributions from WIPO Secretariat

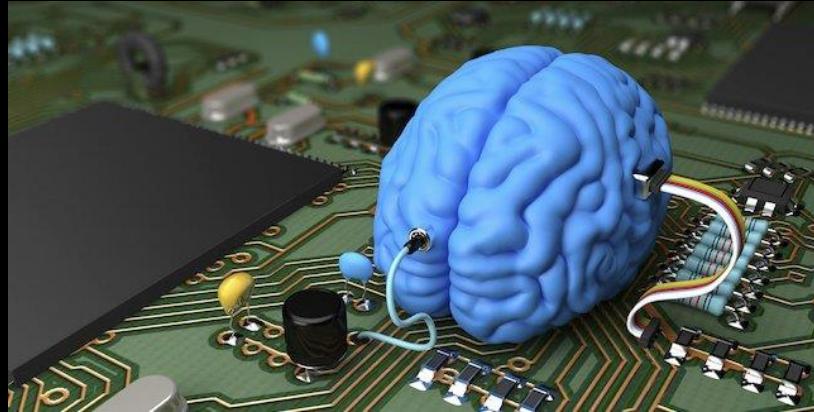
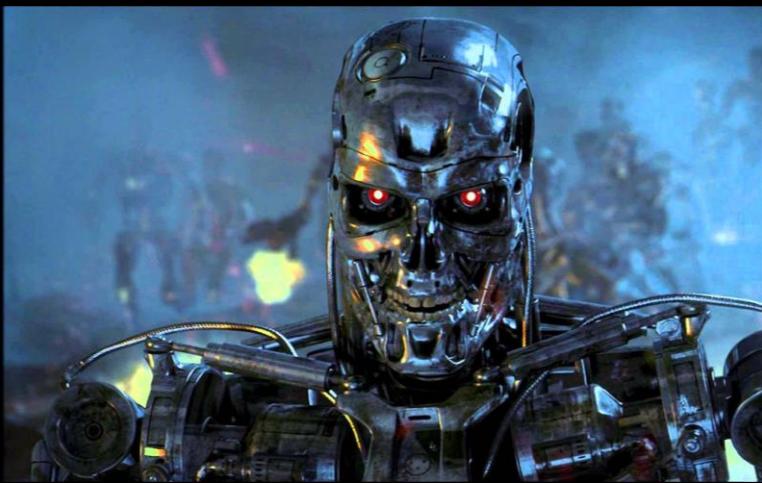


Expansion levels

Automated Patent Landscaping
Aaron Abood and Dave Feltenberger
Google, Inc
LTDCA-2016 proceedings

Patent Universe





What Society Thinks I do



What other Computer
Engineers think I do

What My Friends Think I Do

```
In [1]:  
  
import keras  
  
Using TensorFlow backend.
```

What I actually do

**Prediction is Very Difficult,
Especially if it is about the Future!
- Niels Bohr**

Thank You



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