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Artificial Intelligence made Friendly

A toy app to play with a simple Neural Network

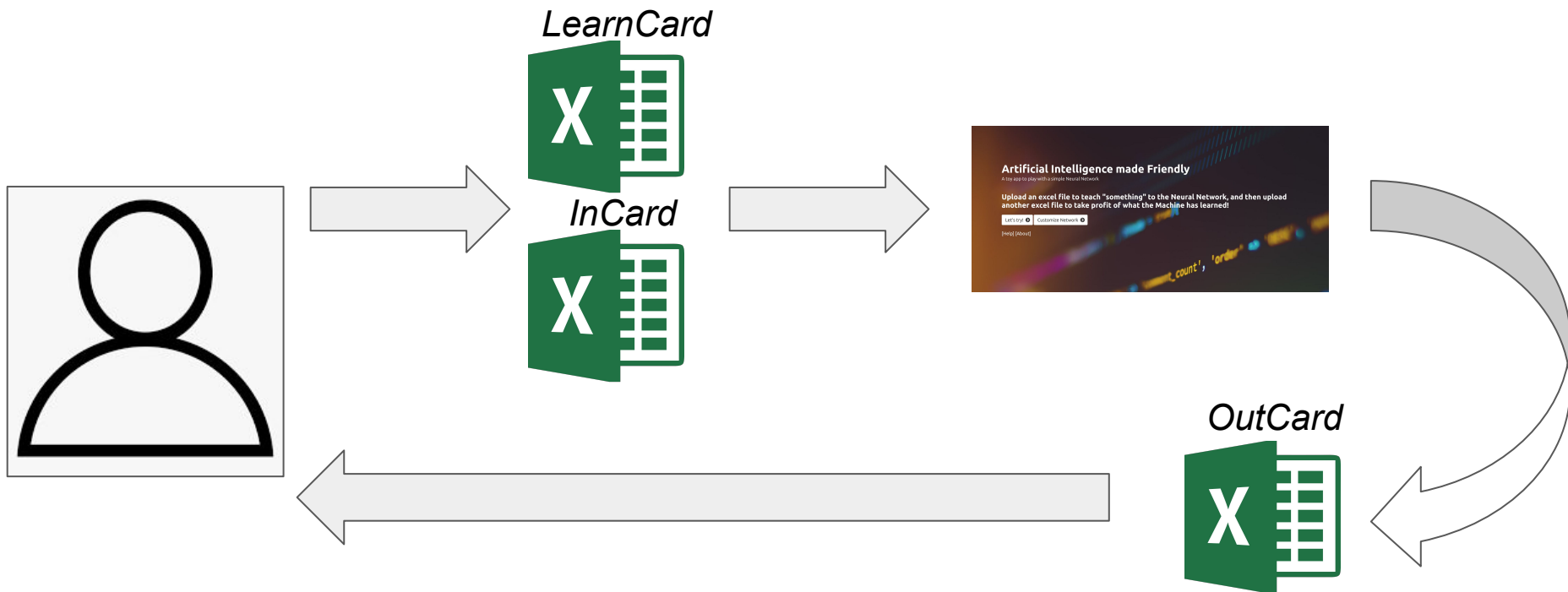
Upload an excel file to teach "something" to the Neural Network, and then upload another excel file to take profit of what the Machine has learned!

Let's try! ➤

Customize Network ➤

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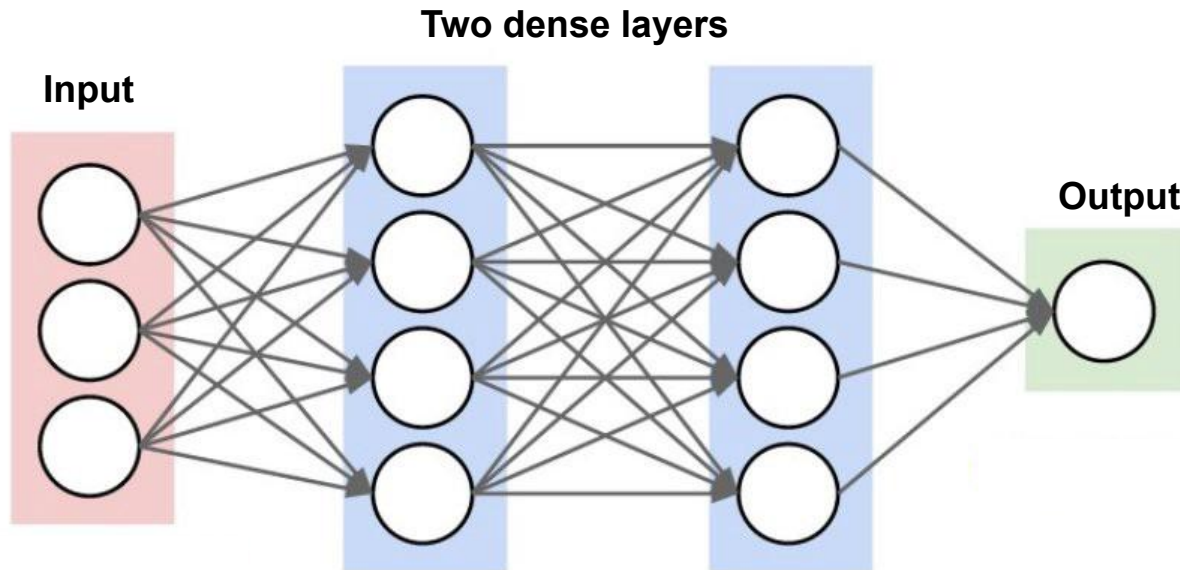
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Example Input: house prices

	A	B	C	D	E	F	G	H	I	J	K
1	LotArea	OverallQual	OverallCond	TotalBsmtSF	FullBath	HalfBath	BedroomAbvGr	TotRmsAbvGrd	Fireplaces	GarageArea	AboveMedianPrice
2	8450	7	5	856	2	1	3	8	0	548	1
3	9600	6	8	1262	2	0	3	6	1	460	1
4	11250	7	5	920	2	1	3	6	1	608	1
5	9550	7	5	756	1	0	3	7	1	642	0
6	14260	8	5	1145	2	1	4	9	1	836	1
7	14115	5	5	796	1	1	1	5	0	480	0
8	10084	8	5	1686	2	0	3	7	1	636	1
9	10382	7	6	1107	2	1	3	7	2	484	1
10	6120	7	5	952	2	0	2	8	2	468	0
11	7420	5	6	991	1	0	2	5	2	205	0

What type of problems? Binary classification





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Basic usage (1/3)

Step 1: LearnCard

Upload an excel file with the info the NN should learn. Must consist in $N+1$ columns: in each row, the first N columns hold a number that describes a feature of the given event (one event by row); whereas the $N+1$ column is either a 1 or a 0 if the row belongs to a given category or not.



Choose a file...

LearnCard.xlsx

Next





Basic usage (2/3)

Step 2: InCard

Upload an excel file with only N columns: each column is the same feature as in the previous LearnCard file. The Machine Learning process will add a last column with a 1 or 0, accordingly to what has learned from the patterns taught in the LearndCard file.



Choose a file...

InCard.xlsx

Back

Next





Basic usage (3/3)

Last Step: Mail

Once our server processes your request we'll send you an email with the new excel file consisting in your InCard plus a last column completed by the Machine Learning algorithm.

Process



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Network Customization (1/2)

Let's try! > Customize Network >

[Help] [About]

More Options!

Neurons

Layer 1: 8
Layer 2: 8

Activation

☒ ReLu ☐ Tanh

Epochs: 100



Network Customization (2/2)

Let's try! ➔ Customize Network ➔

[Help] [About]

Less Options!

Optimizer

☒ SGD ☐ Adam

Extra Features

☐ Noisy

☐ Norm

☐ Sin(x)

☐ Quad

☐ Conv

Neurons

Layer 1

8

- +

Layer 2

8


- +

Layer 3

8

- +

Activation

☒ ReLu

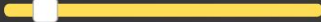
☐ Tanh

☐ SeLu

Epochs 100



Batch Size 32



Learning Rate 1%





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Results (1/2)

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Welcome again!

This is your job's result page.

Here you will find more details on the network that you've just trained.

Your uploaded LearnCard used for the AI training can be found here:

[LearnCard_Islands.xlsx](#)

You can also upload a new InCard and get more predictions. Have fun!

No file chosen

My InCards

Your InCards are listed here

[InCard_Islands.xlsx](#)

My OutCards

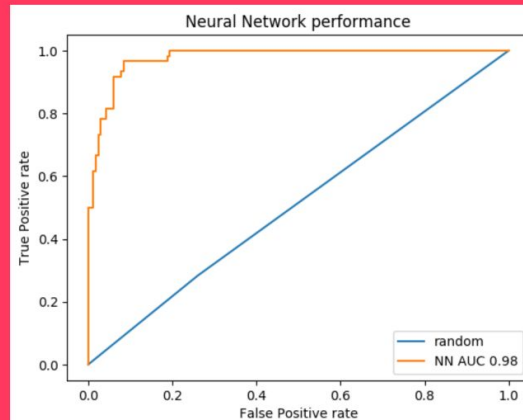
And these are your results

[out_InCard_Islands.xlsx](#)

Model performance

This plot resumes the prediction power of the trained network.

The network is better trained when it has high values of 'true positive' prediction at low values of 'false positive' prediction.





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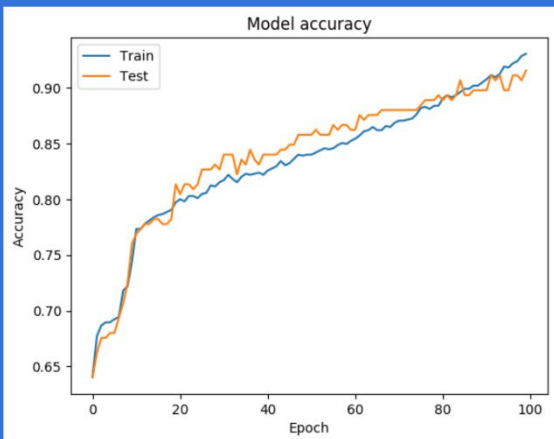


Results (2/2)

Accuracy

In this plot you can see the accuracy of the trained model after each learning step (epoch).

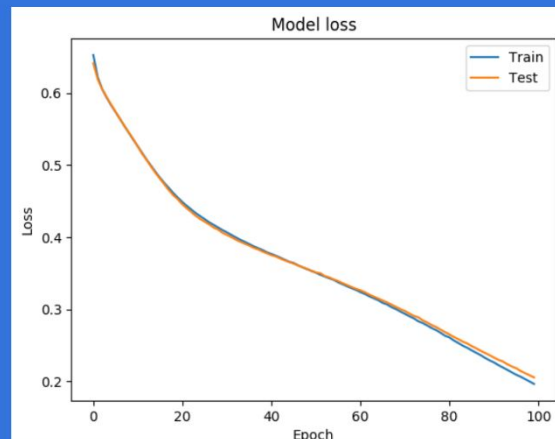
Given a subset of 'N' examples taken from the LearnCard, the accuracy is the ratio of the number of correct answers predicted by the neural network to N. From the net number of examples in the LearnCard, the Train curve takes into account those used for training, while the Test curve is a small subset reserved for testing only.



Loss

This plot shows the computation of the loss function (a quantity that is used to optimize the network) as the learn step (epoch) increases.

The network is better trained when it has lower 'loss' values. Beware that a big separation between the 'Train' and 'Test' curves could indicate a case of model overfitting.





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<> Code

! Issues

🔗 Pull requests

▶ Actions

main ▾

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GastonMazzei first commit

..

LHC

circuits

complex-dynamics

exoplanets

group-theory

ising

quantum-tunneling

More examples are welcome!

- Physics
- Mathematics
- Others?

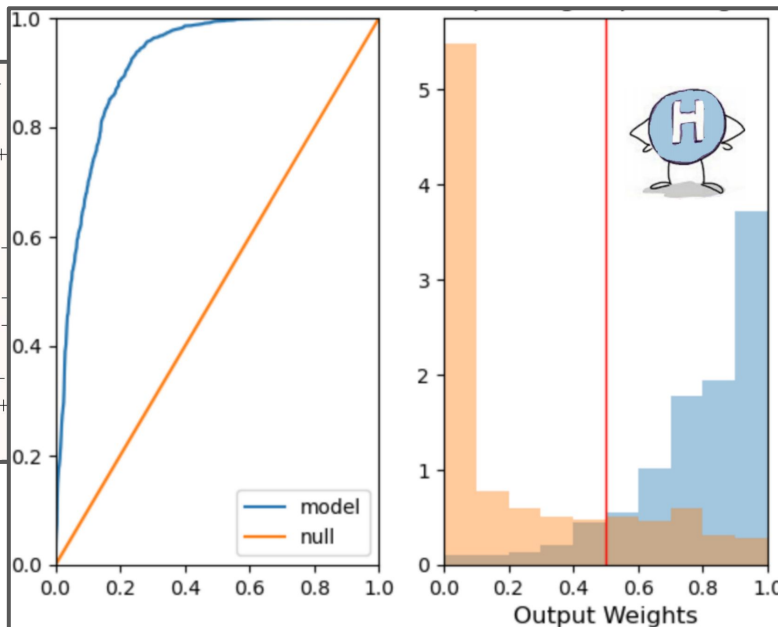




Applications (1/2) : Creation and Annihilation of Higgs Bosons

$$\begin{aligned} & \frac{2M}{g} H + \frac{1}{2} (H^2 + \phi^0 \phi^0 + 2\phi^+ \phi^-) + \frac{2M^4}{g^2} \alpha_h - ig c_w [\partial_\nu Z_\mu^0 (W_\mu^+ W_\nu^- - W_\mu^- W_\nu^+) - Z_\nu^0 (W_\mu^+ \partial_\nu W_\mu^- - W_\mu^- \partial_\nu W_\mu^+) + Z_\mu^0 (W_\nu^+ \partial_\nu W_\mu^- - W_\nu^- \partial_\nu W_\mu^+)] - ig s_w [\partial_\nu A_\mu (W_\mu^+ W_\nu^- - W_\mu^- W_\nu^+) - A_\nu (W_\mu^+ \partial_\nu W_\mu^- - W_\mu^- \partial_\nu W_\mu^+) + A_\mu (W_\nu^+ \partial_\nu W_\mu^- - W_\nu^- \partial_\nu W_\mu^+)] - \frac{1}{2} g^2 W_\mu^+ W_\mu^- W_\nu^+ W_\nu^- + \frac{1}{2} g^2 W_\mu^+ W_\mu^- W_\nu^+ W_\nu^- + g^2 c_w^2 (Z_\mu^0 W_\mu^+ Z_\nu^0 W_\nu^- - Z_\mu^0 Z_\nu^0 W_\mu^+ W_\nu^-) + g^2 s_w^2 (A_\mu W_\mu^+ A_\nu W_\nu^- - A_\mu A_\nu W_\mu^+ W_\nu^-) + g^2 s_w c_w [A_\mu Z_\nu^0 (W_\mu^+ W_\nu^- - W_\mu^- W_\nu^+) - 2A_\mu Z_\mu^0 W_\nu^+ W_\nu^-] - g\alpha [H^3 + H\phi^0 \phi^0 + 2H\phi^+ \phi^-] - \frac{1}{8} g^2 \alpha_h [H^4 + (\phi^0)^4 + 4(\phi^+ \phi^-)^2 + 4(\phi^0)^2 \phi^+ \phi^- + 4H^2 \phi^+ \phi^- + 2(\phi^0)^2 H^2] - g M W_\mu^+ W_\mu^- H - \frac{1}{2} g \frac{M}{c_w^2} Z_\mu^0 Z_\mu^0 H - \frac{1}{2} ig [W_\mu^+ (\phi^0 \partial_\mu \phi^- - \phi^- \partial_\mu \phi^0) - W_\mu^- (\phi^0 \partial_\mu \phi^+ - \phi^+ \partial_\mu \phi^0)] + \frac{1}{2} g [W_\mu^+ (H \partial_\mu \phi^- - \phi^- \partial_\mu H) - W_\mu^- (H \partial_\mu \phi^+ - \phi^+ \partial_\mu H)] + \frac{1}{2} g \frac{1}{c_w} (Z_\mu^0 (H \partial_\mu \phi^0 - \phi^0 \partial_\mu H) - ig \frac{s_w^2}{c_w} M Z_\mu^0 (W_\mu^+ \phi^- - W_\mu^- \phi^+)) - ig s_w M A_\mu (W_\mu^+ \phi^- - W_\mu^- \phi^+) - ig \frac{1-2c_w^2}{2c_w} Z_\mu^0 (\phi^+ \partial_\mu \phi^- - \phi^- \partial_\mu \phi^+) + ig s_w A_\mu (\phi^+ \partial_\mu \phi^- - \phi^- \partial_\mu \phi^+) - \frac{1}{4} g^2 W_\mu^+ W_\mu^- [H^2 + (\phi^0)^2 + 2\phi^+ \phi^-] - \frac{1}{4} g^2 \frac{1}{c_w} Z_\mu^0 Z_\mu^0 [H^2 + (\phi^0)^2 + 2(2s_w^2 - 1)\phi^+ \phi^-] - \frac{1}{2} g^2 \frac{s_w^2}{c_w} Z_\mu^0 Z_\mu^0 (W_\mu^+ \phi^- - W_\mu^- \phi^+) - \frac{1}{2} ig^2 \frac{s_w^2}{c_w} Z_\mu^0 H (W_\mu^+ \phi^- - W_\mu^- \phi^+) + \frac{1}{2} g^2 s_w A_\mu \phi^0 (W_\mu^+ \phi^- - W_\mu^- \phi^+) + \frac{1}{2} ig^2 \frac{s_w^2}{c_w} A_\mu H (W_\mu^+ \phi^- - W_\mu^- \phi^+) - \frac{1}{2} g^2 s_w (2s_w^2 - 1) Z_\mu^0 A_\mu \phi^+ \phi^- \end{aligned}$$

Standard model Lagrangian

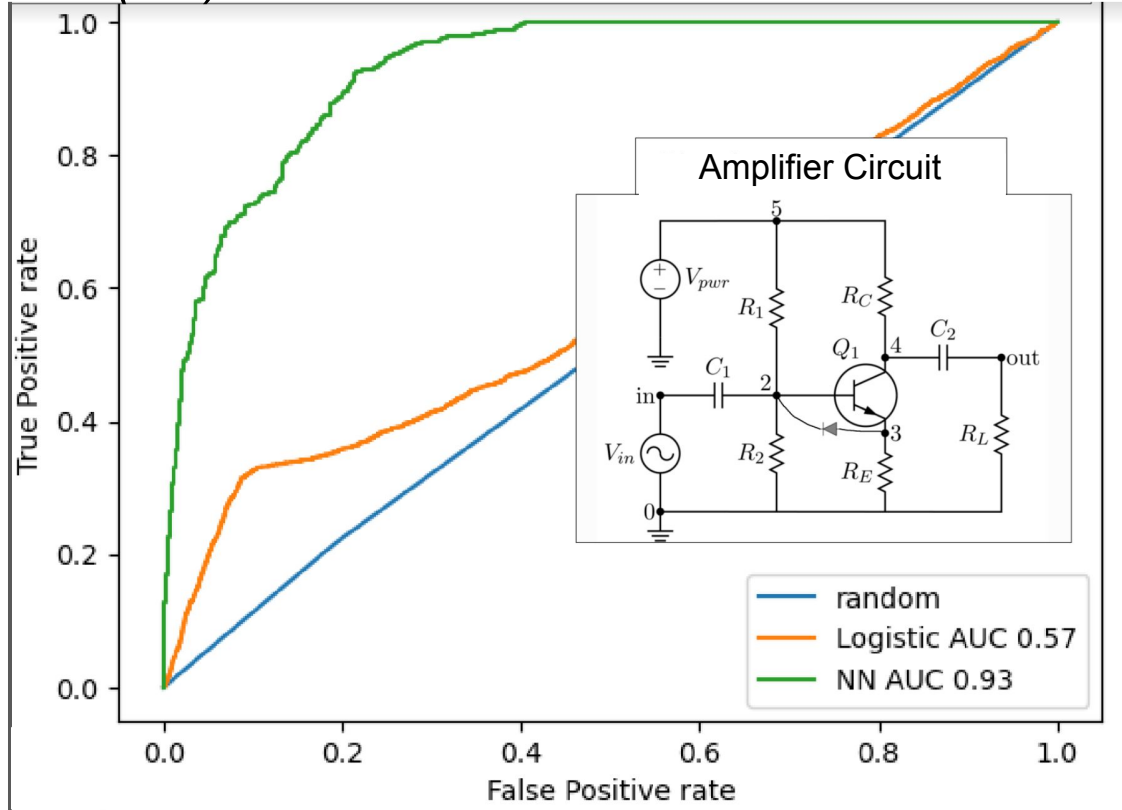


Classification Results

phi	pt	jmas	ntrk	btag	had/em	dum1	dum2
0							
2.896	69.48	0.00	0.0	0.0	0.00	0.0	0.0
-1.189	57.64	0.00	0.0	0.0	0.00	0.0	0.0
0.451	29.94	8.03	4.0	0.0	2.47	0.0	0.0
0.243	25.93	4.98	9.0	0.0	0.63	0.0	0.0
2.869	23.62	0.00	0.0	0.0	0.00	0.0	0.0
0							
-1.056	73.44	14.01	2.0	0.0	0.05	0.0	0.0
1.949	61.59	2.35	0.0	0.0	0.01	0.0	0.0
2.358	28.22	6.57	4.0	0.0	0.00	0.0	0.0
-0.435	23.75	0.00	0.0	0.0	0.00	0.0	0.0
0							
3.074	89.89	0.00	0.0	0.0	0.00	0.0	0.0
-0.001	48.14	3.88	1.0	0.0	0.00	0.0	0.0
0.264	34.79	5.59	9.0	0.0	1.17	0.0	0.0
0.210	15.72	0.00	0.0	0.0	0.00	0.0	0.0
0							
1.406	92.08	0.00	0.0	0.0	0.00	0.0	0.0
0.047	77.44	15.17	11.0	0.0	0.35	0.0	0.0
-2.329	66.83	16.81	6.0	0.0	0.39	0.0	0.0
3.106	34.30	6.51	6.0	0.0	0.00	0.0	0.0
-1.577	23.91	6.85	6.0	0.0	0.00	0.0	0.0

Particle Collision Simulations

Applications (2/2): Threshold Currents in Circuit Simulations





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Thank you for your time!



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Contributions are welcome at: <https://github.com/GastonMazzei/ai-friendly.com>