

Nanoinformatics Model Development & Hosting

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A place to

deploy discuss

share

use

models

JAQPOT



Jaqpot in a nutshell



- **Develop models** on various runtimes and **deploy** them as web services in seconds
- **Validate** your models and **generate predictions** with a user friendly interface
- Make them **transparent** to the users with flexible **documentation** methods
- **Share** your models and make them **accessible** to selected users, collaborators, or groups
- **Integrate** them with your applications within seconds
- Meet your **scalability** requirements

JAQPOT



From model to web service in 1 line



Fullerenes, Nanotubes, and Carbon Nanostructures, 16: 40-57, 2008
Copyright © Taylor & Francis Group, LLC
ISSN 1536-8130; print/ISSN 1366-5847 online
DOI: 10.1080/15368130701779115

A Molecular-Based Model for Prediction of Solubility of C₆₀ Fullerene in Various Solvents

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University of Telah
²Department of Chemistry, Faculty of Engineering, Malek-Abdellatif Univ
Tehran

Abstract In this presented work, a quantitative (QSPR) was done for prediction of solubility of C₆₀ in various solvents. All of these molecular descriptors are only calculated from the chemical structure of solvents. For considering nonlinear behavior of appearing molecular descriptors in QM-QR models, a feed forward neural network (FFNN) was constructed and optimized for prediction of solubility of C₆₀ fullerene in solvents. Obtained models consistently showed better accuracy in comparison with the previous models.

Keywords: C₆₀, QSPR, GAMLR, FFNN

1. INTRODUCTION

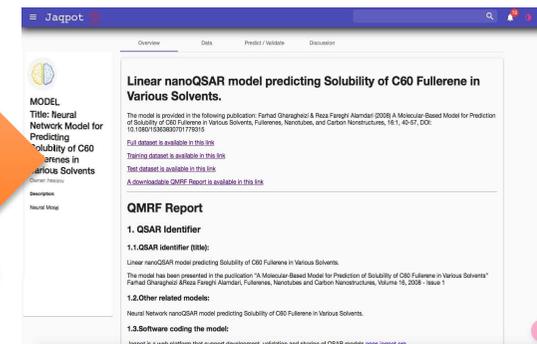
About 30 years have passed since the soccer-ball C₆₀ molecules first occurred in the minds of theorists (1-3), which is now generally recognized as being

Received 23 July 2007; Accepted 22 September 2007
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```
url=jaqpot.deploy_pipeline(clf_RFE2,XRFE3,Yall1,"ORN consensus RFE 6","Logistic Regression+RFE","linearmodel")
url
```

jaqpot.deploy_pipeline() parameters are:

- pipeline : sklearn pipeline model is a trained sklearn model
- X : pandas dataframe (X variables).
- y : pandas dataframe (y variables).
- title
- description
- algorithm



The model can be used
1. over the web page
2. in Python notebooks using the jaqpot.predict command

```
[ ] dfJQ_RFE, predicts_RFE = jaqpot.predict(XRFE3, modelId=url)
```

and
3. over the API

The PMML description of the model is produced for PMML-enabled algorithms.

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
1 <!DOCTYPE pmml xmlns:pmml="http://www.dmg.org/PMML-V4_0" xmlns:ext="http://www.jpmml.org/jpmml-model/InlineTable" version="4.0">
2 <model xmlns="http://www.dmg.org/PMML-V4_0" xmlns:ext="http://www.jpmml.org/jpmml-model/InlineTable" version="4.0">
3 <header>
4 <application name="PMML-Scalogram" version="1.0.14"/>
5 <timestamp>2012-03-18T13:36:43Z</timestamp>
6 </header>
7 <description>
8 <extension base="PMML" name="Scalogram" version="1.0.14"/>
9 <extension base="Scalogram" name="Scalogram" version="1.0.14"/>
10 </description>
11 <input>
12 <datafield name="Log5_Exp" optype="continuous" datatype="double"/>
13 <datafield name="RFE2" optype="continuous" datatype="double"/>
14 <datafield name="RFE3" optype="continuous" datatype="double"/>
15 <datafield name="RFE4" optype="continuous" datatype="double"/>
16 <datafield name="RFE5" optype="continuous" datatype="double"/>
17 <datafield name="RFE6" optype="continuous" datatype="double"/>
18 </input>
19 <output>
20 <datafield name="Solubility" optype="continuous" datatype="double"/>
21 </output>
22 <transformations>
23 <function name="Log5_Exp" usagetype="target"/>
24 <function name="RFE2"/>
25 <function name="RFE3"/>
26 <function name="RFE4"/>
27 <function name="RFE5"/>
28 <function name="RFE6"/>
29 </transformations>
30 <model>
31 <extension base="Scalogram" name="Scalogram" version="1.0.14"/>
32 <extension base="Scalogram" name="Scalogram" version="1.0.14"/>
33 <extension base="Scalogram" name="Scalogram" version="1.0.14"/>
34 <extension base="Scalogram" name="Scalogram" version="1.0.14"/>
35 </model>
```



Jaqpote user interface



Jaqpote

Overview Data Predict / Validate Discussion

MODEL
Title: Linear Model for Predicting Solubility of C60 Fullerenes in Various Solvents
Owner: hsarimv
Description:
Linear Model for Predicting Solubility of C60 Fullerenes in Various Solvents

Choose method

Predict
Validate

Upload dataset with the required independent features and values

↓ ↑

Input values for the independent features

piPC03 ATS1m Seigp More23e
H1m

Predict-validate tab

1. Create predictions

- by manually entering values
- CSV datasets using Jaqpote-generated template (*specific for each model*)

1. Validate model performance:

using an external validation dataset as input in CSV format

J A Q P O T



Model description



MODEL

Title: Linear Model for Predicting Solubility of C60 Fullerenes in Various Solvents

Owner: Jason Sotiropoulos

Description:

Linear Model for Predicting Solubility of C60 Fullerenes in Various Solvents

QMRf Report

1. QSAR Identifier

1.1. QSAR identifier (title):

Linear nanoQSAR model predicting Solubility of C60 Fullerene in Various Solvents.

The model has been presented in the publication "A Molecular-Based Model for Prediction of Solubility of C60 Fullerene in Various Solvents" Farhad Gharagheizi & Reza Fareghi Alamdari, Fullerenes, Nanotubes and Carbon Nanostructures, Volume 16, 2008 - Issue 1

1.2. Other related models:

Neural Network nanoQSAR model predicting Solubility of C60 Fullerene in Various Solvents.

1.3. Software coding the model:

Jaqpot is a web platform that support development, validation and sharing of QSAR models [apps.jaqpot.org](https://www.jaqpot.org)

MODEL

Title: Linear Model for Predicting Solubility of C60 Fullerenes in Various Solvents

Owner: Jason Sotiropoulos

Description:

Linear Model for Predicting Solubility of C60 Fullerenes in Various Solvents

Dependent feature / Predicted feature

logS Exp.

Independent features

ATS1m

Description: Broto-Mreua autocorrelation of a topological structure-lag 1/weighted by atomic masses

piPC03

Description: Molecular multiple path count of order 03

Seigp

Description: 3D-MORSE-signal 23/weighted by atomic sanderson electronegativities

More23e

Description: Eigenvalue sum from polarizability weighted distance matrix

Information on the model can be provided in
Markdown:

<https://www.markdownguide.org/basic-syntax/>

Feature documentation is a critical part of a model interpretation.

Model features can be documented with

- Description
- Units
- Ontological classes



Jaqpot - Social network of models



The screenshot displays the Jaqpot web interface. At the top, there is a blue navigation bar with the Jaqpot logo on the left and search, notification (51), and user profile icons on the right. Below the navigation bar, a horizontal menu contains four tabs: 'Overview', 'Data', 'Predict / Validate', and 'Discussion'. The 'Discussion' tab is highlighted with a red rectangular border. On the left side of the page, there is a model card with a brain icon. The card contains the following text: 'MODEL', 'Title: Linear Model for Predicting Solubility of C60 Fullerenes in Various Solvents', 'Owner: hsarimv', and 'Description: Linear Model for Predicting Solubility of C60 Fullerenes in Various Solvents'. To the right of the model card, there is a comment section with the text 'Leave a comment' and 'I am speechless.' Below the comment is a blue 'Save' button. In the bottom right corner of the page, there is a pink circular button with a pencil icon.



Jaqpot - Sharing of resources



The screenshot shows a user profile for Philip Doganis (filipposd) on the Jaqpot platform. The profile includes sections for 'About', 'Occupation', 'Occupation at', 'Lives at city', and 'Country'. A 'CREATE' button is visible below the 'Organizations' list. A dropdown menu is open, showing a list of shared models with their respective sharing methods (e.g., 'Shared model through Lab ...', 'Shared model through Nan...'). A 'MODEL SHARED' dialog box is overlaid on the right, displaying the following information:

MODEL SHARED

model shared through organization NanoCommons

| | | |
|-------------|----------------------|---|
| From user | filipposd | ▼ |
| Shared with | NanoCommons | ▼ |
| model | ORN consensus RFE 34 | ▼ |

At the bottom of the dialog, there are two buttons: 'View' (highlighted in pink) and 'remove'.



Jaqpote - Shared space - Models



Models ▸ Mine ▸

- Model title: ...us RFE 5
Jun 10, 2019
- Model title: ORN consensus RFE 4
Jun 10, 2019
- Model title: ORN consensus RFE 34
Jun 7, 2019
- Model title: Neural network model predicting DILI
Mar 14, 2019

Jaqpote

Home Models ▸ Shared ▸ With NanoCommons ▾

Items per page: 20 1 - 14 of 14

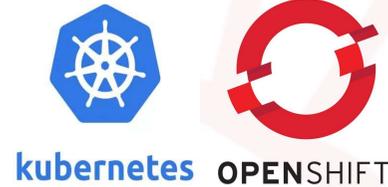
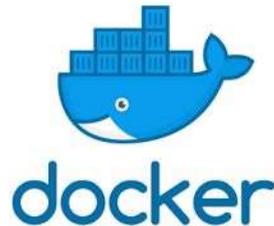
| | | | |
|------------------------------|--|-----------------------------------|------------------|
| Datasets Shared / Private | Model title: Model predicting pEC50 in metal oxide Jun 10, 2019 | Lab of Process Control and Inf... | No item selected |
| Models Shared / Private | Model title: Model predicting pEC50 in metal oxide Jun 9, 2019 | NanoCommons | ⚠ |
| Trash | Model title: Model predicting pEC50 in metal oxide Jun 9, 2019 | OpenRiskNet | |
| | Model title: Model predicting pEC50 in metal oxide Jun 9, 2019 | PhilipTest | |
| | Model title: Model predicting pEC50 in metal oxides, MLR, mod_5 Jun 9, 2019 | TestPhilip | |
| | Model title: Model predicting pEC50 in metal oxides, MLR, mod_4 | | |



Meet the scalability requirements

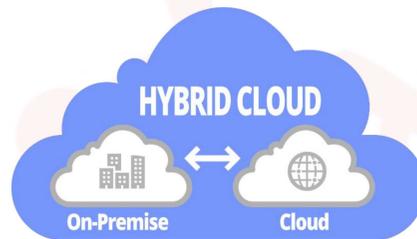


All Jaqpot services are running through containers. Consists of REST microservices that can be scaled to meet the requirements of the infrastructure.



Kubernetes allows the container management and incorporates high availability of the services. It can be deployed on any public, private or hybrid cloud. Jaqpot services can run on any such system

Jaqpot can support any solution. It can be deployed on any infrastructure. Public / Private or On-Premise.



An open source software product to allow OpenID Connect single sign-on with Identity Management and Access Management aimed at modern applications and services. Variety of user or identity providers can be integrated. From google to LDAP and Kerberos to meet the security needs of an organization

Right now integrated with



Under the stewardship of:



JAQPOT



Integration through Application Programming Interfaces (APIs)



Jaqpot API 5.0.1 ORCID

<https://api.jaqpot.org/jaqpot/services/openapi.json>

Jaqpot v5 is the 5th version of a YAQP, a RESTful web platform which can be used to train machine learning models and use them to obtain toxicological predictions for given chemical compounds or engineered nano materials. Jaqpot v4 has integrated read-across, optimal experimental design, interlaboratory comparison, biokinetics and dose response modelling functionalities. The project is developed in Java8 and JEE7 by the [Unit of Process Control and Information in the School of Chemical Engineering at the National Technical University of Athens](#).

Charalampos Chomenidis, Panagiotis Sotgiannis, Evangelia Anagnostopoulou, Angelos Valsamis, Georga Drakakis, Panagiotis Karatzas, Georgia Tsiliki, Philip Doganis, Haralambos Sarinweis - Website
Send email to Charalampos Chomenidis, Panagiotis Sotgiannis, Evangelia Anagnostopoulou, Angelos Valsamis, Georga Drakakis, Panagiotis Karatzas, Georgia Tsiliki, Philip Doganis, Haralambos Sarinweis

Servers

Authorize

| | | |
|-------------|---|---|
| aa | | ⌵ |
| GET | /services/aa/claims | Requests authorization from SSO |
| POST | /services/aa/validate/accesstoken | Validate authorization token |
| POST | /services/aa/login | |
| algorithm | | ⌵ |
| GET | /services/algorithm | Finds all Algorithms |
| POST | /services/algorithm | Creates Algorithm |
| GET | /services/algorithm/{id} | Finds Algorithm |
| PUT | /services/algorithm/{id} | Modifies a particular Algorithm resource |
| POST | /services/algorithm/{id} | Creates Model |
| DELETE | /services/algorithm/{id} | Unregisters an algorithm of given ID |
| bibtex | | ⌵ |
| GET | /services/bibtex/{id} | Returns BibTeX entry |
| PUT | /services/bibtex/{id} | Places a new BibTeX entry at a particular URI |
| DELETE | /services/bibtex/{id} | Deletes a particular BibTeX resource |
| GET | /services/bibtex | Finds all BibTeX entries |
| POST | /services/bibtex | Creates a new BibTeX entry |
| biokinetics | | ⌵ |
| POST | /services/biokinetics/pksim/createmodel | Creates Biokinetics model with PKSim |
| POST | /services/biokinetics/http/createmodel | Creates an http biocinetics Model |
| POST | /services/biokinetics/http/model/{id} | Creates prediction with trk model |

API clients

- **Nuget Package (.NET):**
<https://www.nuget.org/packages/JaqpotNet/1.0.0>
- **Go(lang) Package:**
<https://github.com/euclia/gojaqpot>
- **Java:**
<https://search.maven.org/artifact/xyz.euclia/jaqpotj/0.0.1/jar>
- **Javascript Package:**
<https://www.npmjs.com/package/@euclia/jaqpot-client>
- **Python Package:** <https://pypi.org/project/jaqpotpy/>

<https://api.jaqpot.org/jaqpot/swagger/>

Jaqpot integrated applications and services: NanoCommons Risk Assessment Tool



NanoCommons Risk Assessment Tool

Short description

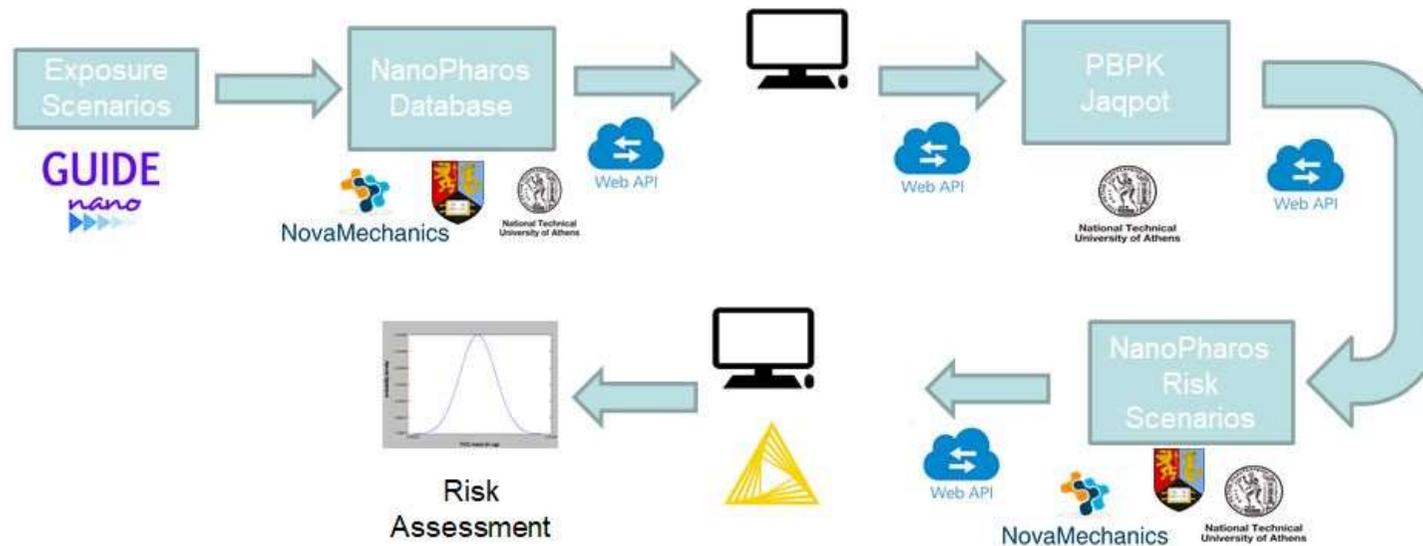
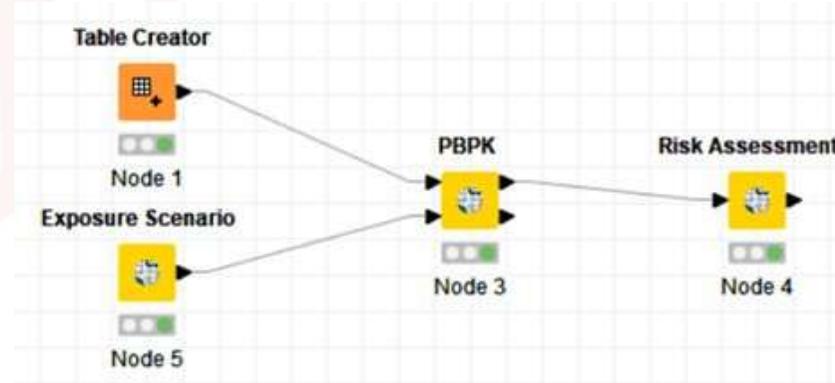
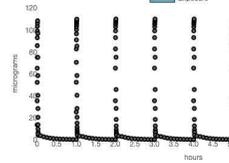
The workflow is a combination of nanoinformatics tools available through the NanoCommons computational infrastructure. This web application, hosted and implemented within [Enalos Cloud Platform](#), estimates the risk of triggering AOP 173 (Lung Fibrosis) in mice due to exposure to 20nm TiO₂ engineered nanoparticles.

External exposure: Four different exposure scenarios have been simulated using the [GUIDENano tool](#). The user can alternatively enter a custom-made scenario.

Case 1

45 g (initial mass 3000 kg) of TiO₂ (22nm) poured over 7 hours in the NF, with 1 min activity duration every hour. For every hour the mouse stays 90 s in the NF and spends the rest of the time in the FF.

Download timeseries



<http://enaloscloud.novamechanics.com/nanocommons/exposure/>

Support for PBPK models

≡ Jaqpot
Search: jaqpot

Overview
Features
Predict / Validate
Discussion
Archive

MODEL
Title: Diazepam Model

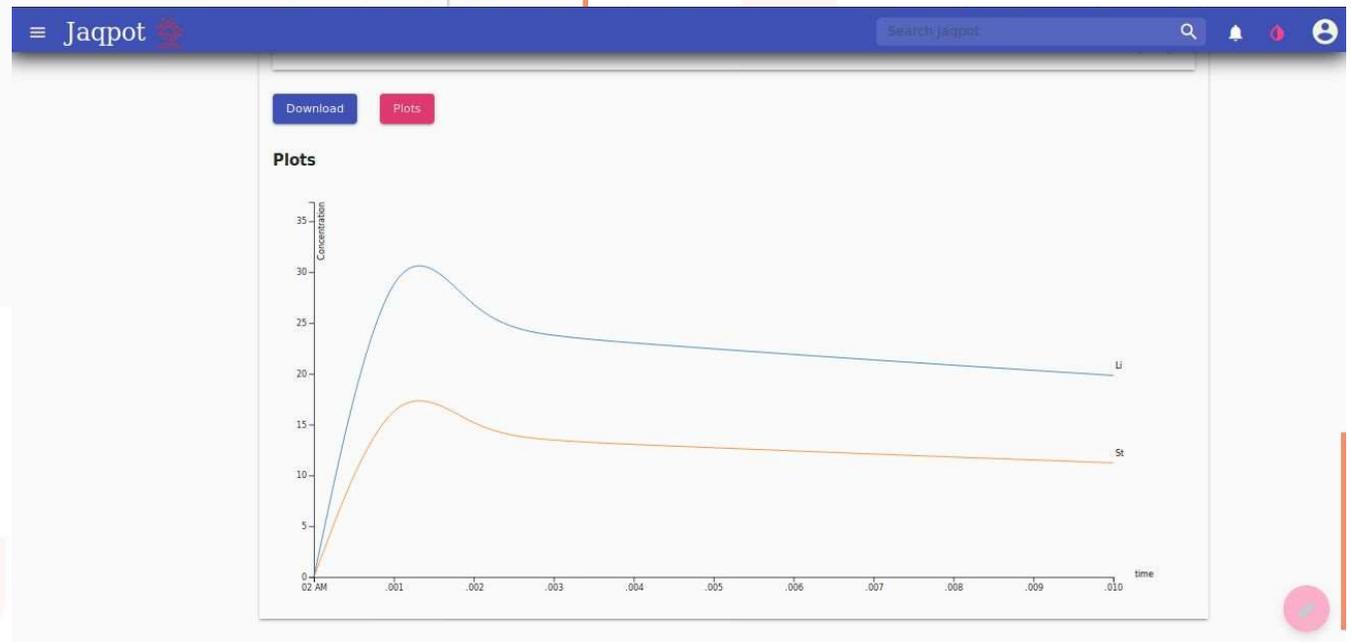
Owner: periklists

Description:

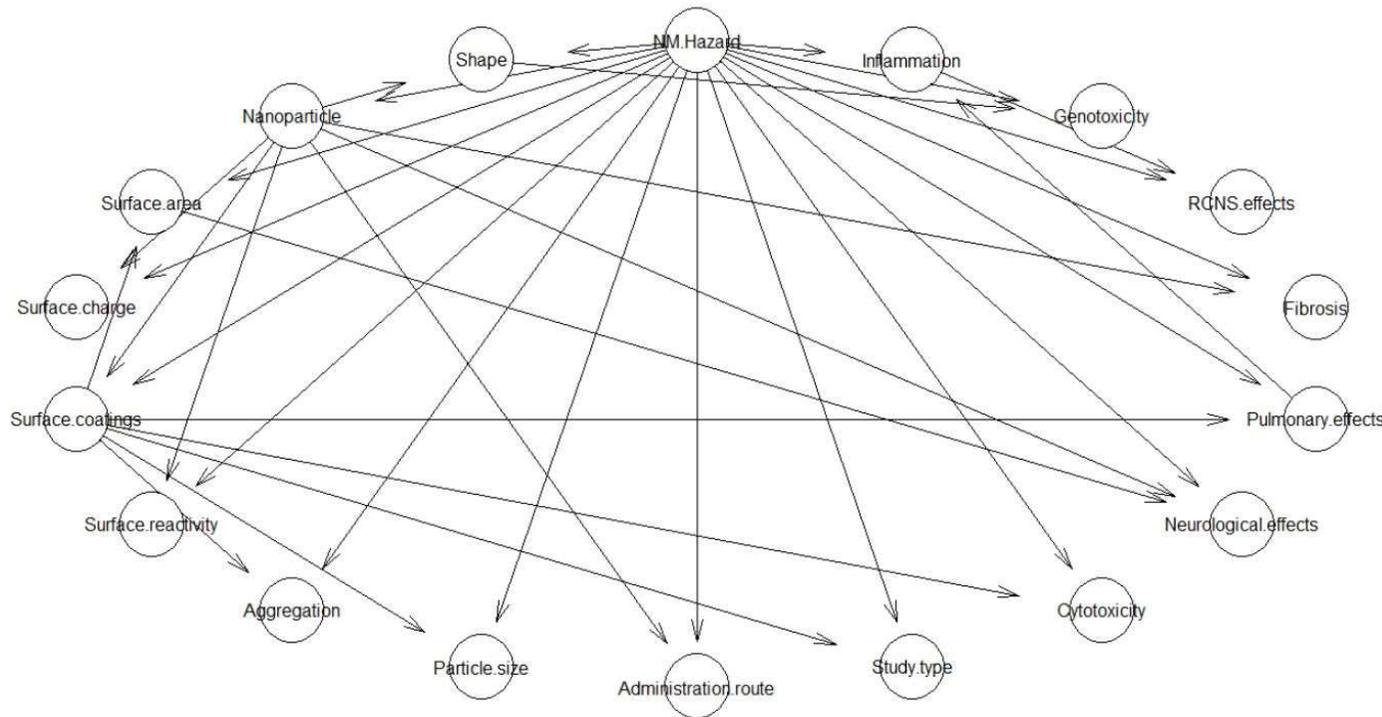
This is an updated PBPK model for describing the biodistribution of diazepam in humans post intravenous injection.

Diazepam PBPK model

The detailed description of the PBPK model used can be found in [Gueorgueiva et al., 2006](#). Its schematic representation can be seen in the following figure. It consists of 11 compartments describing the concentration of the drug in various tissues, namely liver (LI), kidney (KI), brain (BR), intestine (IN), stomach (ST), muscle (MU), adipose (AD), skin (SK), gonads (GO), heart (HT) and lungs (LU), one compartment to model the rest of the body (RE) as well as two blood pools; venous (VEN) and arterial (ART). The parameters of the model are divided into drug-dependent and physiological (drug-independent) parameters. The first category comprises eleven tissue-to-plasma partition coefficients (K_p), fraction unbound in plasma (f_u), blood-to-plasma ratio (R), and intrinsic hepatic clearance (CL_{int} , in L/h). The physiological parameters of the model are simply the regional tissue blood flows (Q) and tissue volumes (V).

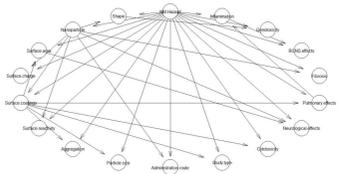


Support for safe-by-design product development strategies through integration of Bayesian network models



Conceptual diagram of properties with Bayesian networks

Support for safe-by-design product development strategies through integration of Bayesian network models



Conceptual diagram of properties with Bayesian networks

SdD use case:

Use the web service to design safe (low-hazard) NMs

Input values for the independent features

| | | | |
|--|---|---|---|
| Study.type NA In vitro/in vivo | Inflammation None None/Low/Medium/High | Cytotoxicity None None/Low/Medium/High | Genotoxicity None None/Low/Medium |
| Neurological.effects None None/Low/Medium/High | query node Surface.coatings One of the names of the nodes presented in the "Independent features" tab | Pulmonary.effects None None/Low/Medium/High | Administration.route Inhalation Inhalation/Injection/Intravenous/Oral |
| NM.Hazard None | Surface.area 0-15 | Surface.coatings NA | Nanoparticle TiO2 |

| Id | probability | prediction.class | query.node |
|----|---|---|------------------|
| 0 | [0.996, 0, 0, 0, 0, 0, 0, 0, 0, 0.004, 0, 0, 0] | [AHPP, Amine, Carbon, Carboxyl, Citrate, Hydroxyl, None, PVP, Silianes-aluminium, SO3-, Sulphate, Triethoxycapryl silane] | Surface.coatings |

Items per page: 30 1 - 1 of 1 < >

Download



How Jaqqpot can serve your needs

- **Publish your model** as web services
- Provide **ready-to-use implementations** of your models as supporting material to your publications
- **Collaborate** with your partners and colleagues
- **Share models** within your group, project or organisation and with the general public
- **Embed and integrate Jaqqpot models** into other applications and workflows via API clients.
- Use Jaqqpot as your **modelling environment**.

JAQQPOT

Useful links:

| | |
|--|--|
| Jaqpote web platform | https://app.jaqpote.org/home |
| Jaqpote accounts application | https://accounts.jaqpote.org/ |
| Jaqpote technical documentation | https://www.jaqpote.org/ |
| Jaqpote swagger API documentation | https://api.jaqpote.org/jaqpote/swagger/ |
| Jaqpote tutorials | Jaqpote 5 - User accounts Jaqpote 5: How to manage and use organisations Jaqpote 5: How to access and use an existing predictive model Jaqpote 5: How to deploy a predictive model using the jaqpote library Jaqpote 5: How to simulate biodistribution scenarios using custom PBPK models |
| Recent hackathons | Online QSAR Modelling Hackathon by Easy Access to Jaqpote https://zenodo.org/record/4683925#.YYIrsrIBxPM |

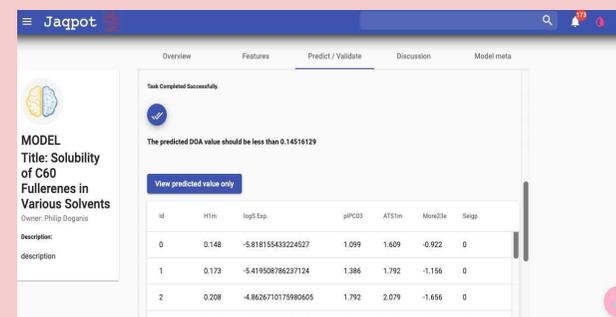


NM dataset in Excel



No-installation

Jaqpote through python in Google Colab



Online model and web service in Jaqpote

Jaqpot development team

| | |
|-----------------------------|---|
| Sarimveis Haralambos | Professor, Unit of Process Control & Informatics, School of Chemical Engineering, National Technical University Of Athens, Greece |
| Doganis Philip | Senior Researcher, Laboratory & Teaching Staff |
| Karatzas Pantelis | Doctoral Researcher, Head Developer |
| Tsiros Periklis | Doctoral Researcher |
| Sotiropoulos Jason | Doctoral Researcher |

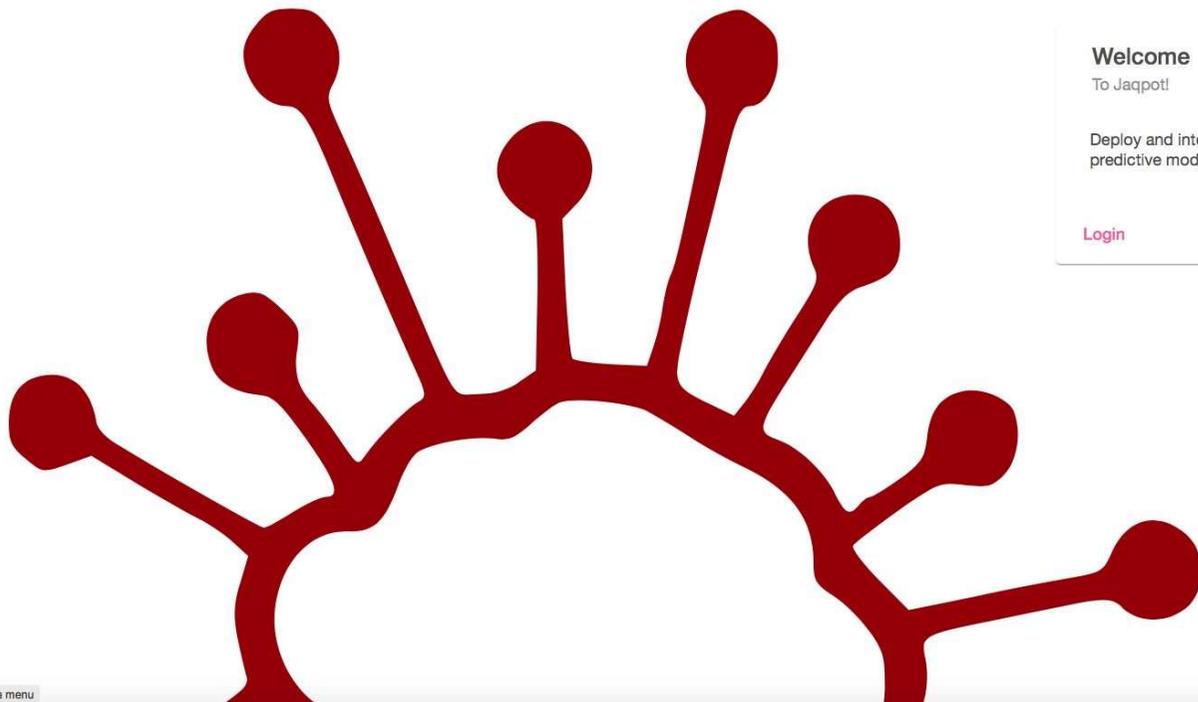


Thank you

JAQPOT



Jaqpote 5



Welcome
To Jaqpote!

Deploy and integrate with your predictive models

[Login](#)

JAQPOT

English v

Log In

Username or email

Password

Remember me [Forgot Password?](#)

New user? [Register](#)

Play a menu

JAQPOT



Jaqpot 5 - NanoCommons Organization page



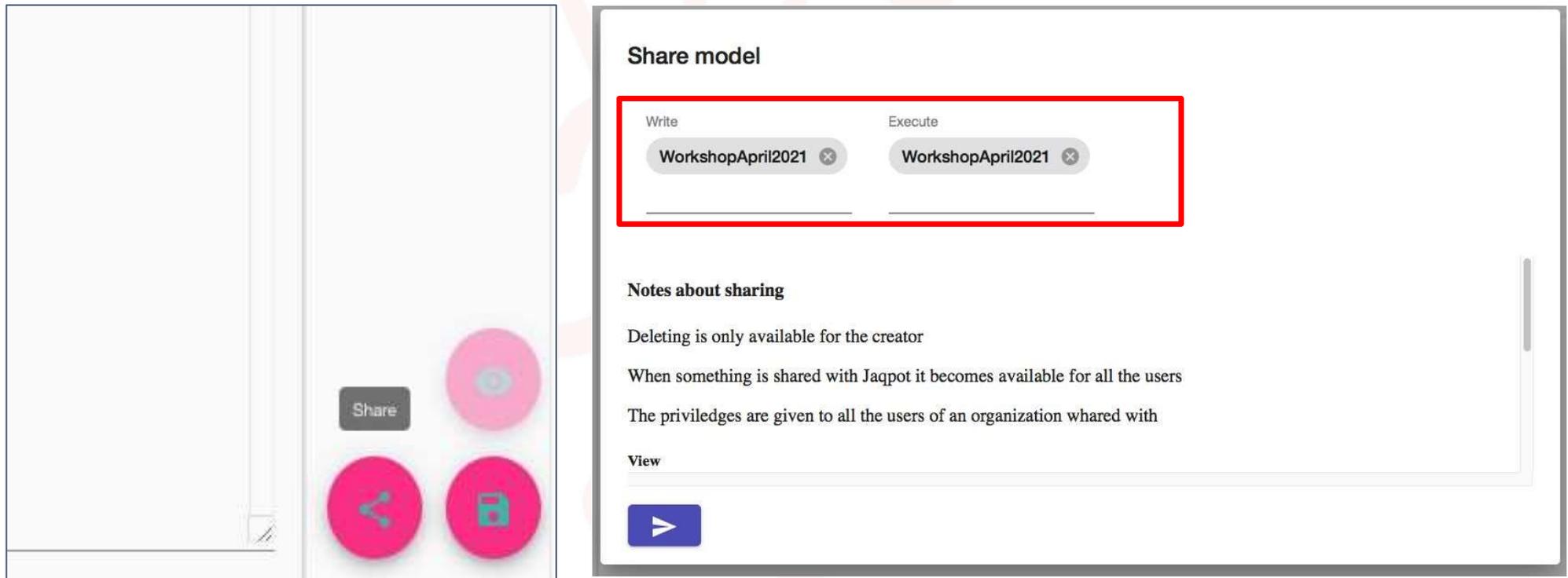
The screenshot displays the 'Accounts' page for the 'NanoComm' organization. The interface includes a navigation menu, a profile section with a logo and 'About' text, and a main content area with several expandable sections:

- Users:** Organization users (2 icons)
- Admins:** Organization admins (1 icon)
- Organization domains:** Website LinkedIn and github
 - Website: <https://www.nanocommons.eu>
 - Github: <https://github.com/NanoCommons>
 - LinkedIn: <https://www.linkedin.com/company/nanocommons/>
- Contact points:** Contact the organization

JAQPOT

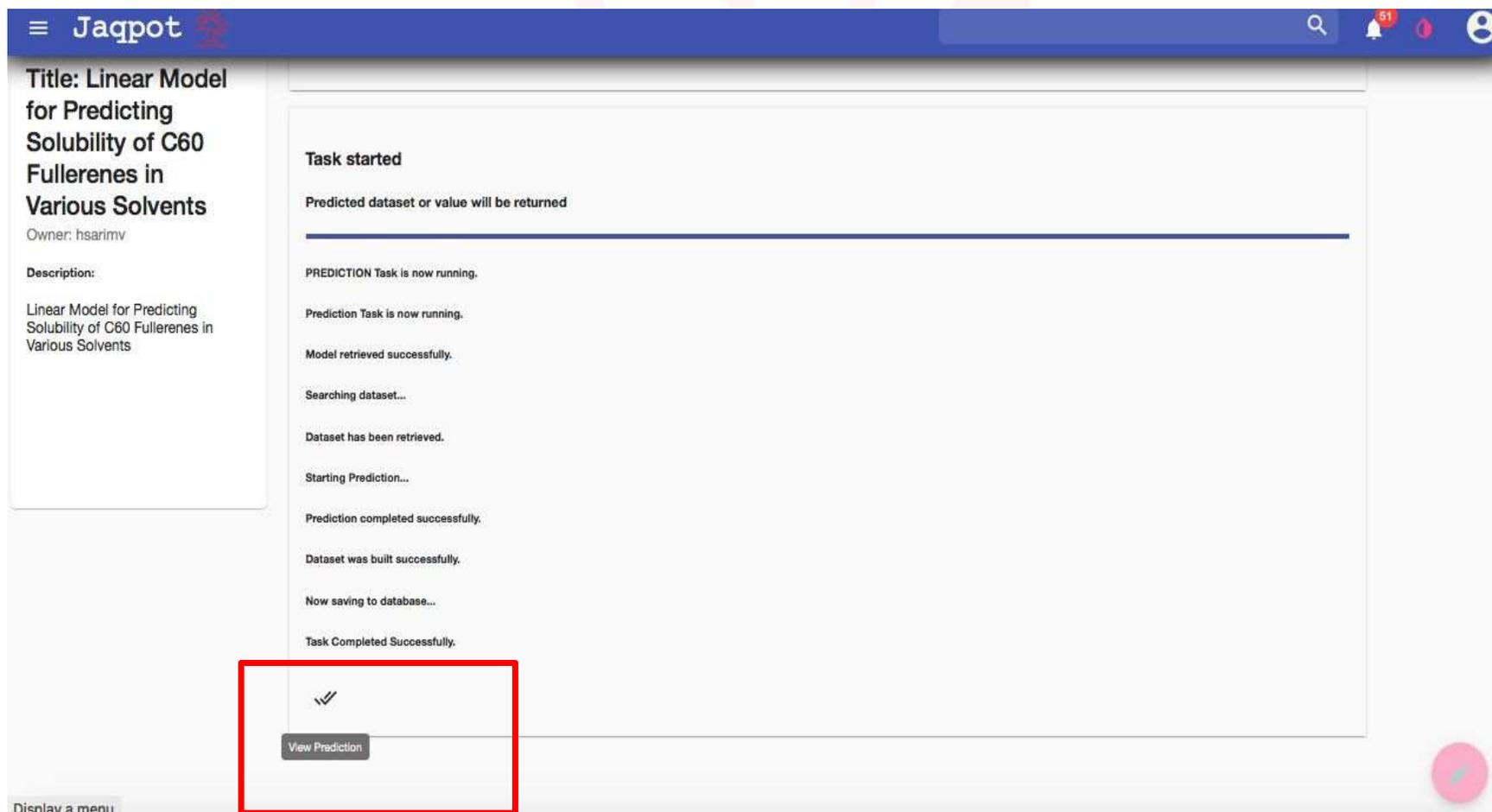
<https://accounts.jaqpot.org/organization/joR8745jm3Q8AQrp>

Jaqpote 5 - Model page - Sharing



The screenshot displays the sharing interface for a model in Jaqpote 5. On the left, a vertical sidebar contains a 'Share' button and three circular icons: a pink play button, a pink share icon, and a pink lock icon. The main content area is titled 'Share model' and features a red-bordered box containing two input fields. The first field is labeled 'Write' and contains the text 'WorkshopApril2021' with a close button (X). The second field is labeled 'Execute' and also contains 'WorkshopApril2021' with a close button (X). Below this box, the text 'Notes about sharing' is followed by three lines of information: 'Deleting is only available for the creator', 'When something is shared with Jaqpote it becomes available for all the users', and 'The privileges are given to all the users of an organization whared with'. A 'View' section is partially visible at the bottom, showing a blue play button icon.

Jaqpot 5 - Model page - Predict tab



The screenshot shows the Jaqpot 5 Model page in the Predict tab. The page has a blue header with the Jaqpot logo and navigation icons. The main content area is divided into a left sidebar and a central main area. The sidebar contains the model title, owner information, and a description. The main area displays a list of status messages indicating the progress of the prediction task. A red box highlights a 'View Prediction' button at the bottom of the main area.

Title: Linear Model for Predicting Solubility of C60 Fullerenes in Various Solvents
Owner: hsarimv
Description: Linear Model for Predicting Solubility of C60 Fullerenes in Various Solvents

Task started
Predicted dataset or value will be returned

PREDICTION Task is now running.
Prediction Task is now running.
Model retrieved successfully.
Searching dataset...
Dataset has been retrieved.
Starting Prediction...
Prediction completed successfully.
Dataset was built successfully.
Now saving to database...
Task Completed Successfully.


[View Prediction](#)

Jaqqot 5 - Predictions

Starting Prediction...

Prediction completed successfully.

Dataset was built successfully.

Now saving to database...

Task Completed Successfully.



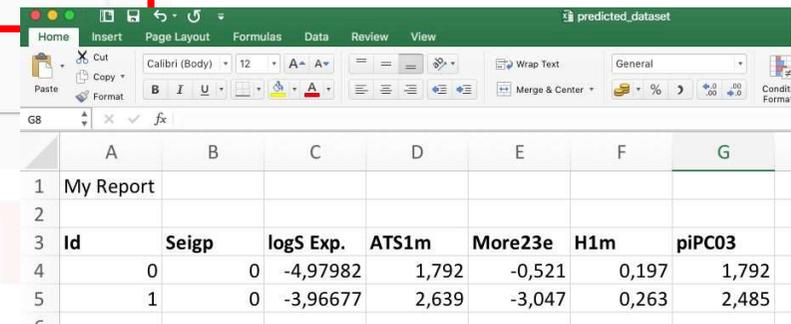
[View predicted value only](#)

| Id | Seigp | logS Exp. | ATS1m | More23e | H1m | piPC03 |
|----|-------|--------------------|-------|---------|-------|--------|
| 0 | 0 | -4.186807760539802 | 2.197 | -1.227 | 0.358 | 2.485 |

Items per page: 30 1 - 1 of 1 < >

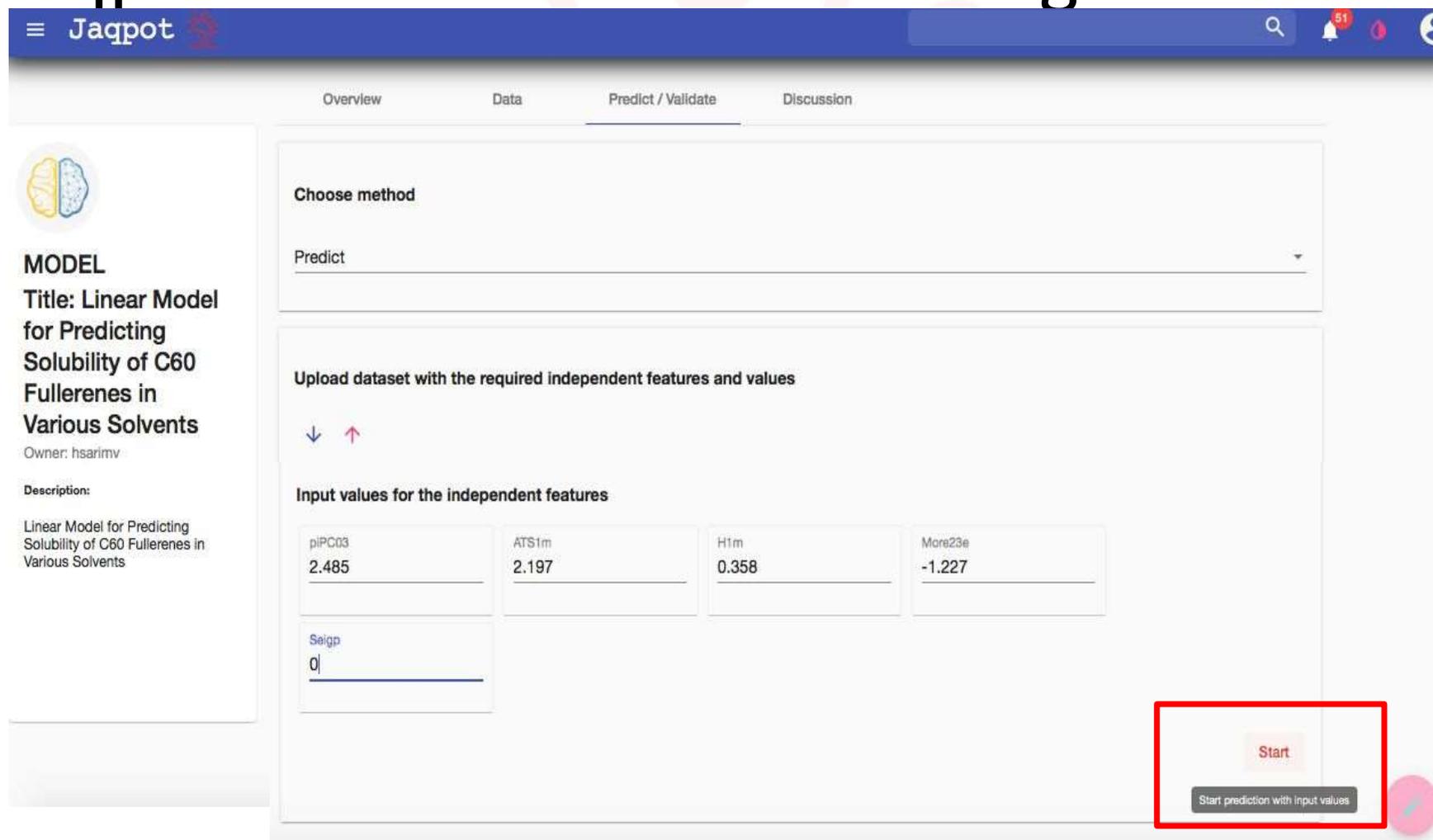
[Download](#)

Predictions can be downloaded in CSV format



| | A | B | C | D | E | F | G |
|---|-----------|--------------|------------------|--------------|----------------|------------|---------------|
| 1 | My Report | | | | | | |
| 2 | | | | | | | |
| 3 | Id | Seigp | logS Exp. | ATS1m | More23e | H1m | piPC03 |
| 4 | 0 | 0 | -4,97982 | 1,792 | -0,521 | 0,197 | 1,792 |
| 5 | 1 | 0 | -3,96677 | 2,639 | -3,047 | 0,263 | 2,485 |

Jaqpote 5 - Predict tab - Entering values



The screenshot shows the Jaqpote 5 web interface in the 'Predict / Validate' tab. The left sidebar contains a model card for 'Linear Model for Predicting Solubility of C60 Fullerenes in Various Solvents'. The main area has a 'Choose method' dropdown set to 'Predict', an 'Upload dataset' section with up/down arrows, and an 'Input values for the independent features' section with input fields for piPC03 (2.485), ATS1m (2.197), H1m (0.358), More23e (-1.227), and Seip (0). A red box highlights the 'Start' button and the 'Start prediction with input values' button.

MODEL
Title: Linear Model for Predicting Solubility of C60 Fullerenes in Various Solvents
Owner: hsarimv
Description: Linear Model for Predicting Solubility of C60 Fullerenes in Various Solvents

Overview Data **Predict / Validate** Discussion

Choose method
Predict

Upload dataset with the required independent features and values
↓ ↑

Input values for the independent features

| | | | |
|-----------------|----------------|--------------|-------------------|
| piPC03 2.485 | ATS1m 2.197 | H1m 0.358 | More23e -1.227 |
| Seip 0 | | | |

Start
Start prediction with input values

Jaqpote 5 - Predict tab – Your data via template

Upload dataset with the required independent features and values

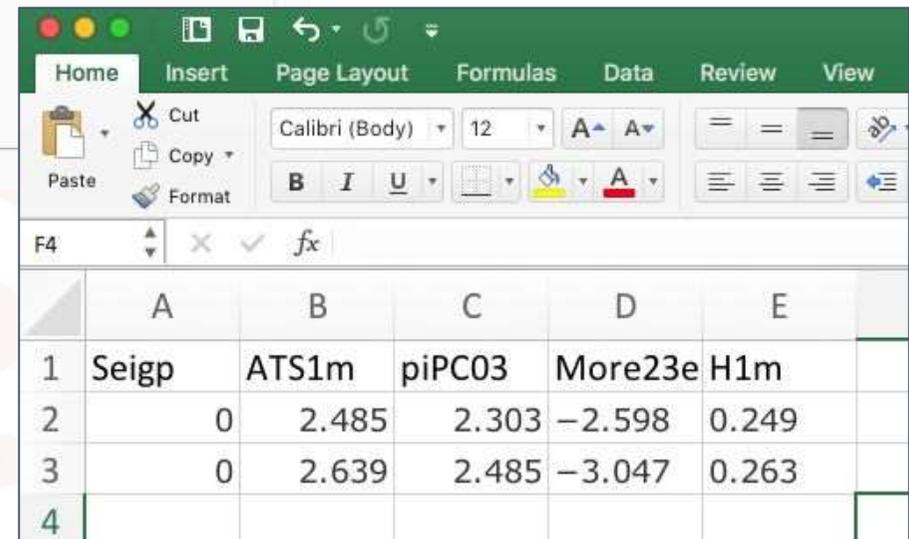
↓ ↑

Download template dataset (csv)

Input values for the independent features

| | | | |
|---------|-------|-------|-----|
| piPC03 | ATS1m | Seigp | H1m |
| More23e | | | |

Jaqpote automatically generates a template for users to enter their data, upload to Jaqpote and get predictions.



| | A | B | C | D | E |
|---|-------|-------|--------|---------|-------|
| 1 | Seigp | ATS1m | piPC03 | More23e | H1m |
| 2 | 0 | 2.485 | 2.303 | -2.598 | 0.249 |
| 3 | 0 | 2.639 | 2.485 | -3.047 | 0.263 |
| 4 | | | | | |



Jaqpot 5 - Sharing notification



The screenshot shows a notification modal titled "MODEL SHARED" overlaid on a user profile page. The notification text reads "model shared through organization NanoCommons". Below the text is a table with three rows, each containing a label, a value, and a dropdown arrow. At the bottom of the modal are two buttons: "View" (highlighted in pink) and "remove".

| | | |
|-------------|----------------------|---|
| From user | filippod | ▼ |
| Shared with | NanoCommons | ▼ |
| model | ORN consensus RFE 34 | ▼ |

[View](#) [remove](#)