

INR Prediction XML RPC Specification

(version 0.1 – June 6, 2006)

XML RPC is a simple protocol for remote procedure calls. Parameters and return values are encoded in XML messages and transported between the client and server through the HTTP protocol. Specifications for XML RPC can be found here: <http://www.xmlrpc.com/spec>

The INR prediction method requires the following parameters (in order):

Name	Type	Description/Details
age	<i>double</i>	Age in years.
height	<i>double</i>	Height in inches.
weight	<i>double</i>	Weight in kilograms.
smoker	<i>boolean</i>	
targetINR	<i>double</i>	
baselineINR	<i>struct</i>	The struct contains two members: value: baseline INR value (<i>double</i>) date_time: date/time of the baseline INR (<i>datetime</i>)
INRs	<i>vector</i>	INR history (in chronological order). Each element of the vector is a struct containing two members: value: INR value (<i>double</i>) date_time: date/time of the INR (<i>datetime</i>)
doses	<i>vector</i>	Dose history (in chronological order). Each element of the vector is a struct containing two members: value: dose amount in mg (<i>double</i>) date_time: date/time of the dose (<i>datetime</i>)
futureDoses	<i>vector</i>	Future doses (in chronological order). Each element of the vector is a struct containing two members: value: dose amount in mg (<i>double</i>) date_time: date/time of the dose (<i>datetime</i>)
numFutureINRs	<i>int</i>	The number of future INRs to predict

The XML RPC response will be a *struct* containing the following fields:

Name	Type	Description/Details
dose	<i>double</i>	The predicted dose.
mean_error	<i>double</i>	The mean error as a percentage.
future_inr	<i>vector</i>	Future INRs. Each element of the vector is a struct containing two members: value: future INR value (<i>double</i>) date_time: date/time of the future INR (<i>datetime</i>)
future_dose	<i>vector</i>	Future doses. Each element of the vector is a struct containing two members: value: future dose amount in mg (<i>double</i>) date_time: date/time of the future dose (<i>datetime</i>)
predicted_inr	<i>vector</i>	Predicted INRs. Each element of the vector is a struct containing two members: value: predicted INR value (<i>double</i>) date_time: date/time of the predicted INR (<i>datetime</i>)

Here is an example of a single procedure call. The patient in this case is 63 years old, 5'8" tall, 235 pounds, and a smoker. His baseline INR is 0.98 at 08:00 on July 1, 2005, and his target INR is 2.5. He has received three doses already: 5.0 mg at 17:00 on July 1, 2005, 5.0 mg at 17:00 on July 2, 2005, and 5.0 mg at 17:00 on July 3, 2005. His INR has been measured three times: 1.01 at 08:00 on July 2, 2005, 1.02 at 08:00 on July 3, 2005, and 1.14 at 08:00 on July 4, 2005. We would like to predict two future INRs.

The XML encoded request would look like this (boxed annotations included for clarity only):

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<methodCall>

  <methodName>predict</methodName>

  <params>
    age is 63 years
    <param><value><double>63.0</double></value></param>
    height is 68 inches (5'8")
    <param><value><double>68.0</double></value></param>
    weight is 106.8 kilograms (235 lbs)
    <param><value><double>106.8</double></value></param>
    smoker is true
    <param><value><boolean>1</boolean></value></param>
    target INR is 2.5
    <param><value><double>2.5</double></value></param>
    baselineINR value is 0.98 at July 01, 2005 08:00
    <param><value>
      <struct>
        <member>
          <name>value</name>
          <value><double>0.98</double></value>
        </member>
        <member>
          <name>date_time</name>
          <value><dateTime.iso8601>20050701T08:00:00</dateTime.iso8601></value>
        </member>
      </struct>
    </value></param>
    INRs are given in chronological order: 1.01 at July 02, 2005 08:00,
                                           1.02 at July 03, 2005 08:00,
                                           1.14 at July 04, 2005 08:00
    <param><value>
      <array><data>
        <value>
          <struct>
            <member>
              <name>value</name>
              <value><double>1.01</double></value>
            </member>
            <member>
              <name>date_time</name>
              <value><dateTime.iso8601>20050702T08:00:00</dateTime.iso8601></value>
            </member>
          </struct>
        </value>
        <value>
          <struct>
            <member>
              <name>value</name>
              <value><double>1.02</double></value>
            </member>
          </struct>
        </value>
      </array>
    </value></param>
  </params>
</methodCall>
```

```

    </member>
    <member>
      <name>date_time</name>
      <value><dateTime.iso8601>20050703T08:00:00</dateTime.iso8601></value>
    </member>
  </struct>
</value>
<value>
  <struct>
    <member>
      <name>value</name>
      <value><double>1.14</double></value>
    </member>
    <member>
      <name>date_time</name>
      <value><dateTime.iso8601>20050704T08:00:00</dateTime.iso8601></value>
    </member>
  </struct>
</value>
</data></array>
</value></param>

```

doses are given in chronological order: 5.0 mg at July 01, 2005 17:00,
 5.0 mg at July 02, 2005 17:00,
 5.0 mg at July 03, 2005 17:00

```

<param><value>
  <array><data>
    <value>
      <struct>
        <member>
          <name>value</name>
          <value><double>5.0</double></value>
        </member>
        <member>
          <name>date_time</name>
          <value><dateTime.iso8601>20050701T17:00:00</dateTime.iso8601></value>
        </member>
      </struct>
    </value>
    <value>
      <struct>
        <member>
          <name>value</name>
          <value><double>5.0</double></value>
        </member>
        <member>
          <name>date_time</name>
          <value><dateTime.iso8601>20050702T17:00:00</dateTime.iso8601></value>
        </member>
      </struct>
    </value>
    <value>
      <struct>
        <member>
          <name>value</name>
          <value><double>5.0</double></value>
        </member>
        <member>
          <name>date_time</name>
          <value><dateTime.iso8601>20050703T17:00:00</dateTime.iso8601></value>
        </member>
      </struct>
    </value>
  </data></array>
</value></param>

```

No future doses in this example

```

<param><value>
  <array><data>
    </data></array>
</value></param>

```

We want to predict 2 future INRs

```
<param><value><int>2</int></value></param>
</params>
</methodCall>
```

The response would then look like this:

```
<?xml version="1.0" encoding="UTF-8"?>
<methodResponse>
  <params>
    <param>
      <value>
        <struct>
          <member>
            <name>dose</name>
            <value>
              <double>6.362735466428912</double>
            </value>
          </member>
          <member>
            <name>predicted_inr</name>
            <value>
              <array>
                <data>
                  <value>
                    <struct>
                      <member>
                        <name>value</name>
                        <value>
                          <double>0.98</double>
                        </value>
                      </member>
                      <member>
                        <name>date_time</name>
                        <value>
                          <dateTime.iso8601>20050701T08:00:00</dateTime.iso8601>
                        </value>
                      </member>
                    </struct>
                  </value>
                  <value>
                    <struct>
                      <member>
                        <name>value</name>
                        <value>
                          <double>0.9920531917621103</double>
                        </value>
                      </member>
                      <member>
                        <name>date_time</name>
                        <value>
                          <dateTime.iso8601>20050702T08:00:00</dateTime.iso8601>
                        </value>
                      </member>
                    </struct>
                  </value>
                  <value>
                    <struct>
                      <member>
                        <name>value</name>
                        <value>
                          <double>1.0677221391855345</double>
                        </value>
                      </member>
                      <member>
                        <name>date_time</name>
                        <value>
                          <dateTime.iso8601>20050703T08:00:00</dateTime.iso8601>
                        </value>
                      </member>
                    </struct>
                  </value>
                </data>
              </array>
            </value>
          </member>
        </struct>
      </value>
    </param>
  </params>
</methodResponse>
```

```
        </value>
      </member>
    </struct>
  </value>
  <value>
    <struct>
      <member>
        <name>value</name>
        <value>
          <double>1.1941936088474583</double>
        </value>
      </member>
      <member>
        <name>date_time</name>
        <value>
          <dateTime.iso8601>20050704T08:00:00</dateTime.iso8601>
        </value>
      </member>
    </struct>
  </value>
</data>
</array>
</value>
</member>
<member>
  <name>future_dose</name>
  <value>
    <array>
      <data>
        <value>
          <struct>
            <member>
              <name>value</name>
              <value>
                <double>6.362735466428912</double>
              </value>
            </member>
            <member>
              <name>date_time</name>
              <value>
                <dateTime.iso8601>20050704T18:00:00</dateTime.iso8601>
              </value>
            </member>
          </struct>
        </value>
        <value>
          <struct>
            <member>
              <name>value</name>
              <value>
                <double>6.362735466428912</double>
              </value>
            </member>
            <member>
              <name>date_time</name>
              <value>
                <dateTime.iso8601>20050705T18:00:00</dateTime.iso8601>
              </value>
            </member>
          </struct>
        </value>
      </data>
    </array>
  </value>
</member>
<member>
  <name>mean_error</name>
  <value>
    <double>3.736459380279711</double>
  </value>
</member>
<member>
  <name>future_inr</name>
  <value>
```

```

</methodResponse>
  </params>
  </param>
</value>
</struct>
</member>
</value>
</array>
</data>
</array>
  <value>
    <struct>
      <member>
        <name>value</name>
        <value>
          <double>1.3568000403972222</double>
        </value>
      </member>
      <member>
        <name>date_time</name>
        <value>
          <dateTime.iso8601>20050705T08:00:00</dateTime.iso8601>
        </value>
      </member>
    </struct>
  </value>
  <value>
    <struct>
      <member>
        <name>value</name>
        <value>
          <double>1.554349458124481</double>
        </value>
      </member>
      <member>
        <name>date_time</name>
        <value>
          <dateTime.iso8601>20050706T08:00:00</dateTime.iso8601>
        </value>
      </member>
    </struct>
  </value>
</data>
</array>
</value>
</member>
</struct>
</value>
</param>
</params>
</methodResponse>

```

This response indicates that the predicted dose is 6.36 with a mean error of 3.73 percent. The predicted doses are: 6.36 mg at 07/04/2005 18:00, 6.36 mg at 06/05/2005 18:00. The predicted INRs are: 1.36 at 6/05/2005 08:00, 1.55 at 06/06/2005 08:00.

Constraints

Input	Constraints
age	Must be greater than 0.
height	Must be greater than 0.
weight	Must be greater than 0.
smoker	
targetINR	Must be greater than or equal to 0.
baselineINR	“value” must be greater than or equal to 0.
doses	Each “value” must be greater than or equal to 0. At least one dose is required.
INRs	Each “value” must be greater than or equal to 0. At least one INR, 12 hours post-dose, is required.
futureDoses	Each “value” must be greater than or equal to 0.
numFutureINRs	Must be non-negative