CRUDE OIL PRICE PREDICTION

SOURCE CODE:


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    "import numpy as np # linear algebra\n",
    "import pandas as pd # data processing, CSV file I/O (e.g. pd.read_csv)\n",
    "import datetime\n",
    "from pylab import rcParams\n",
    "import matplotlib.pyplot as plt\n",
    "import warnings\n",
    "import itertools\n",
    "import statsmodels.api as sm\n",
    "from keras.models import Sequential\n",
    "from keras.layers import Dense\n",
```

```
"from keras.layers import LSTM\n",
"from keras.layers import Dropout\n",
"from sklearn.metrics import mean_squared_error\n",
"from keras.callbacks import ReduceLROnPlateau, EarlyStopping, ModelCheckpoint\n",
"from sklearn.metrics import mean_squared_error\n",
"from sklearn.metrics import mean_absolute_error\n",
"import seaborn as sns\n",
"sns.set_context(\"paper\", font_scale=1.3)\n",
"sns.set_style('white')\n",
"import math\n",
"from sklearn.preprocessing import MinMaxScaler\n",
"# Input data files are available in the \"../input/\" directory.\n",
"# For example, running this (by clicking run or pressing Shift+Enter) will list all files under the input directory\n",
"warnings.filterwarnings(\"ignore\")\n",
"plt.style.use('fivethirtyeight')\n",
"import os\n",
"for dirname, _, filenames in os.walk('/kaggle/input'):\n",
"    for filename in filenames:\n",
"        print(os.path.join(dirname, filename))"
]
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"dateparse = lambda x: pd.datetime.strptime(x, '%b %d, %Y')\n",
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"from google.colab import files\n",
"uploaded = files.upload()"
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            "      </output>\n",
            "      <script>// Copyright 2017 Google LLC\n",
            "//\n",
            "// Licensed under the Apache License, Version 2.0 (the \"License\");\n",
            "// you may not use this file except in compliance with the License.\n",
            "// You may obtain a copy of the License at\n",
            "//\n",
            "//      http://www.apache.org/licenses/LICENSE-2.0\n",
            "//\n",
            "// Unless required by applicable law or agreed to in writing, software\n",
            "// distributed under the License is distributed on an \"AS IS\" BASIS,\n",
            "// WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.\n",
            "// See the License for the specific language governing permissions and\n",
            "// limitations under the License.\n",
            "\n",
            "/**\n",
            " * @fileoverview Helpers for google.colab Python module.\n",
            " */\n",
            "(function(scope) {\n",
            "function span(text, styleAttributes = {}) {\n",
            "  const element = document.createElement('span');\n",
            "  element.textContent = text;\n",
            "  for (const key of Object.keys(styleAttributes)) {\n",
            "    element.style[key] = styleAttributes[key];\n",
            "  }\n",
            "  return element;\n",
            "}\n",
            "\n",
            "// Max number of bytes which will be uploaded at a time.\n",
            "const MAX_PAYLOAD_SIZE = 100 * 1024;\n",
            "\n",
            "function _uploadFiles(inputId, outputId) {\n",
            "  const steps = uploadFilesStep(inputId, outputId);\n",
            "  const outputElement = document.getElementById(outputId);\n",
            "  // Cache steps on the outputElement to make it available for the next call\n",
            "  // to uploadFilesContinue from Python.\n",
            "  outputElement.steps = steps;\n",
```

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"\n",
"  return _uploadFilesContinue(outputId);\n",
"}\n",
"\n",
"// This is roughly an async generator (not supported in the browser yet),\n",
"// where there are multiple asynchronous steps and the Python side is going\n",
"// to poll for completion of each step.\n",
"// This uses a Promise to block the python side on completion of each step,\n",
"// then passes the result of the previous step as the input to the next step.\n",
"function _uploadFilesContinue(outputId) {\n",
"  const outputElement = document.getElementById(outputId);\n",
"  const steps = outputElement.steps;\n",
"\n",
"  const next = steps.next(outputElement.lastPromiseValue);\n",
"  return Promise.resolve(next.value.promise).then((value) => {\n",
"    // Cache the last promise value to make it available to the next\n",
"    // step of the generator.\n",
"    outputElement.lastPromiseValue = value;\n",
"    return next.value.response;\n",
"  });\n",
"}\n",
"\n",
"/**\n",
" * Generator function which is called between each async step of the upload\n",
" * process.\n",
" * @param {string} inputId Element ID of the input file picker element.\n",
" * @param {string} outputId Element ID of the output display.\n",
" * @return {!Iterable<!Object>} Iterable of next steps.\n",
" *\/\n",
"function* uploadFilesStep(inputId, outputId) {\n",
"  const inputElement = document.getElementById(inputId);\n",
"  inputElement.disabled = false;\n",
"\n",
"  const outputElement = document.getElementById(outputId);\n",
"  outputElement.innerHTML = '';\n",
"\n",
"  const pickedPromise = new Promise((resolve) => {\n",
"    inputElement.addEventListener('change', (e) => {\n",
"      resolve(e.target.files);\n",
"    });\n",
"  });\n",
"\n",
"  const cancel = document.createElement('button');\n",
"  inputElement.parentElement.appendChild(cancel);\n",
"  cancel.textContent = 'Cancel upload';\n",
"  const cancelPromise = new Promise((resolve) => {\n",
"    cancel.onclick = () => {\n",
"      resolve(null);\n",
"    };\n",
"  });\n",
```

```
"\n",
"  // Wait for the user to pick the files.\n",
"  const files = yield {\n",
"    promise: Promise.race([pickedPromise, cancelPromise]),\n",
"    response: {\n",
"      action: 'starting',\n",
"    }\n",
"  };\n",
"\n",
"  cancel.remove();\n",
"\n",
"  // Disable the input element since further picks are not allowed.\n",
"  inputElement.disabled = true;\n",
"\n",
"  if (!files) {\n",
"    return {\n",
"      response: {\n",
"        action: 'complete',\n",
"      }\n",
"    };\n",
"  }\n",
"\n",
"  for (const file of files) {\n",
"    const li = document.createElement('li');\n",
"    li.append(span(file.name, {fontWeight: 'bold'}));\n",
"    li.append(span(\n",
"        `(${file.type || 'n/a'}) - ${file.size} bytes, ` +\n",
"        `last modified: ${\n",
"            file.lastModifiedDate ? file.lastModifiedDate.toLocaleDateString() :\n",
"                                    'n/a'} - `));\n",
"    const percent = span('0% done');\n",
"    li.appendChild(percent);\n",
"\n",
"    outputElement.appendChild(li);\n",
"\n",
"    const fileDataPromise = new Promise((resolve) => {\n",
"      const reader = new FileReader();\n",
"      reader.onload = (e) => {\n",
"        resolve(e.target.result);\n",
"      };\n",
"      reader.readAsArrayBuffer(file);\n",
"    });\n",
"    // Wait for the data to be ready.\n",
"    let fileData = yield {\n",
"      promise: fileDataPromise,\n",
"      response: {\n",
"        action: 'continue',\n",
"      }\n",
"    };\n",
"\n",
```

```
    "    // Use a chunked sending to avoid message size limits. See b/62115660.\n",
    "    let position = 0;\n",
    "    do {\n",
    "      const length = Math.min(fileData.byteLength - position, MAX_PAYLOAD_SIZE);\n",
    "      const chunk = new Uint8Array(fileData, position, length);\n",
    "      position += length;\n",
    "\n",
    "      const base64 = btoa(String.fromCharCode.apply(null, chunk));\n",
    "      yield {\n",
    "        response: {\n",
    "          action: 'append',\n",
    "          file: file.name,\n",
    "          data: base64,\n",
    "        },\n",
    "      };\n",
    "\n",
    "      let percentDone = fileData.byteLength === 0 ?\n",
    "          100 :\n",
    "          Math.round((position / fileData.byteLength) * 100);\n",
    "      percent.textContent = `${percentDone}% done`;\n",
    "\n",
    "    } while (position < fileData.byteLength);\n",
    "  }\n",
    "\n",
    "  // All done.\n",
    "  yield {\n",
    "    response: {\n",
    "      action: 'complete',\n",
    "    }\n",
    "  };\n",
    "}\n",
    "\n",
    "scope.google = scope.google || {};\n",
    "scope.google.colab = scope.google.colab || {};\n",
    "scope.google.colab._files = {\n",
    "  _uploadFiles,\n",
    "  _uploadFilesContinue,\n",
    "};\n",
    "})(self);\n",
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```

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      "1 1986-01-03          26.00\n",
      "2 1986-01-06          26.53\n",
      "3 1986-01-07          25.85\n",
      "4 1986-01-08          25.87\n",
      "5 1986-01-09          26.03\n",
      "6 1986-01-10          25.65\n",
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```

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```

```
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"      <td>1986-01-14</td>\n",
"      <td>24.97</td>\n",
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"    <tr>\n",
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"      <td>1986-01-15</td>\n",
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.94-2.06-.94 2.06-2.06.94z\"/><path d=\"M17.41 7.96l-1.37-1.37c-.4-.4-.92-.59-1.43-.59-.52 0-1.04.2-
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.59l7.78-7.78 2.81-2.81c.8-.78.8-2.07 0-2.86zM5.41 20L4 18.59l7.72-7.72 1.47 1.35L5.41 20z\"/>\n",
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"      gap: 12px;\n",
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"      border-radius: 50%;\n",
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"      height: 32px;\n",
"      padding: 0 0 0 0;\n",
"      width: 32px;\n",
```

```
"    }\n",
"\n",
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"      fill: #174EA6;\n",
"    }\n",
"\n",
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"      fill: #D2E3FC;\n",
"    }\n",
"\n",
"    [theme=dark] .colab-df-convert:hover {\n",
"      background-color: #434B5C;\n",
"      box-shadow: 0px 1px 3px 1px rgba(0, 0, 0, 0.15);\n",
"      filter: drop-shadow(0px 1px 2px rgba(0, 0, 0, 0.3));\n",
"      fill: #FFFFFF;\n",
"    }\n",
"  </style>\n",
"\n",
"      <script>\n",
"        const buttonEl =\n",
"          document.querySelector('#df-2367b016-b67f-445c-8b15-4defa2e543d3 button.colab-df-
convert');\n",
"        buttonEl.style.display =\n",
"          google.colab.kernel.accessAllowed ? 'block' : 'none';\n",
"\n",
"        async function convertToInteractive(key) {\n",
"          const element = document.querySelector('#df-2367b016-b67f-445c-8b15-4defa2e543d3');\n",
"          const dataTable =\n",
"            await google.colab.kernel.invokeFunction('convertToInteractive',\n",
"                                                     [key], {});\n",
"          if (!dataTable) return;\n",
"\n",
"          const docLinkHtml = 'Like what you see? Visit the ' +\n",
"            '<a target=\"_blank\"
href=https://colab.research.google.com/notebooks/data_table.ipynb>data table notebook</a>'\n",
"            + ' to learn more about interactive tables.';\n",
"          element.innerHTML = '';\n",
"          dataTable['output_type'] = 'display_data';\n",
"          await google.colab.output.renderOutput(dataTable, element);\n",
"          const docLink = document.createElement('div');\n",
"          docLink.innerHTML = docLinkHtml;\n",
"          element.appendChild(docLink);\n",
"        }\n",
"      </script>\n",
"    </div>\n",
"  </div>\n",
"  "
```

```
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    "df = df.sort_values('Date')\n",
    "df = df.groupby('Date')['Closing Value'].sum().reset_index()\n",
    "df.set_index('Date', inplace=True)\n",
    "df=df.loc[datetime.date(year=2000,month=1,day=1):]"
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```

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"    }\n",
"\n",
"    .dataframe tbody tr th {\n",
"        vertical-align: top;\n",
"    }\n",
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"        text-align: right;\n",
"    }\n",
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"    <tr style=\"text-align: right;\">\n",
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          "                                                     [key], {});\n",
          "          if (!dataTable) return;\n",
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href=https://colab.research.google.com/notebooks/data_table.ipynb>data table notebook</a>'\n",
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.59l7.78-7.78 2.81-2.81c.8-.78.8-2.07 0-2.86zM5.41 20L4 18.59l7.72-7.72 1.47 1.35L5.41 20z\"/>\n",
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"          const element = document.querySelector('#df-4e32bf9f-80e7-48c2-a7c6-abf9974fa83d');\n",
"          const dataTable =\n",
"            await google.colab.kernel.invokeFunction('convertToInteractive',\n",
"                                                     [key], {});\n",
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          "            + ' to learn more about interactive tables.';\n",
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  "    for i in range(len(_data_set) - _look_back - 1):\n",
  "        a = _data_set[i:(i + _look_back), 0]\n",
  "        data_x.append(a)\n",
  "        data_y.append(_data_set[i + _look_back, 0])\n",
  "    return np.array(data_x), np.array(data_y)"
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  "X_test,Y_test=create_data_set(test,look_back)\n",
  "X_test = np.reshape(X_test, (X_test.shape[0], X_test.shape[1], 1))"
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    "reduce_lr = ReduceLROnPlateau(monitor='val_loss',patience=5)\n",
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    "print('Test Mean Absolute Error:', mean_absolute_error(Y_test[0], test_predict[:,0]))\n",
    "print('Test Root Mean Squared Error:',np.sqrt(mean_squared_error(Y_test[0], test_predict[:,0])))\n",
    "plt.figure(figsize=(8,4))\n",
    "plt.plot(history.history['loss'], label='Train Loss')\n",
    "plt.plot(history.history['val_loss'], label='Test Loss')\n",
    "plt.title('model loss')\n",
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