

<p>1. Title of the invention: AutoValuator: AI-Driven Car Price Prediction Model</p>
<p>2. Specify field of technology to which the invention belongs to: This invention belongs to the field of Machine Learning, and Web-based Predictive Systems within Automotive Valuation Technology.</p>
<p>3. List all the currently existing technologies/ products that are similar to your invention: -</p> <ul style="list-style-type: none"> • CarDekho Price Calculator • Cars24 Valuation Tool • OLX Auto Price Estimator • Kelley Blue Book (KBB) • ZigWheels Price Guide
<p>Technical details of the invention</p>
<p>1. Background of the invention: The second-hand car market in India and around the world is rapidly growing. However, determining the accurate resale value of a used car remains a big challenge. Traditional methods often involve manual estimations by dealers, subjective opinions, or hours of online comparisons across multiple platforms. This leads to confusion, pricing bias, and lack of trust in transactions. To overcome this, our invention, AutoValuator, introduces an intelligent web-based application powered by machine learning that predicts the resale value of a car within seconds. The user inputs key attributes of the vehicle—such as brand, year, mileage, transmission type, fuel type, and engine capacity—and receives a price estimate based on a well-trained model using historical car data. We've designed this system to reduce manual effort, increase transparency, and bring consistency to the car valuation process. The model uses Random Forest Regression for optimal performance and handles feature selection, outlier removal, and one-hot encoding techniques to prepare a clean dataset. With a React.js frontend and Flask-based Python backend, the tool ensures quick and responsive interaction. AutoValuator helps both individual car sellers/buyers and businesses like car dealerships or resale platforms to make informed decisions, ensuring fairness and saving time.</p>
<p>2. Drawbacks in existing state-of-art and how your invention helps to overcome such drawbacks: Most current car price estimators suffer from a few limitations:</p> <ul style="list-style-type: none"> • Static Data: They rely on pre-fed, outdated data that doesn't reflect real-time market trends. • Limited Feature Consideration: Many overlook key pricing factors like mileage, transmission, engine specs, or ownership history. • Lack of Flexibility: Users often cannot enter detailed specifications or personalize inputs. • Opaque Estimation Logic: The price calculation methods are not transparent or data-driven.

<p>AutoValuator addresses these limitations by:</p> <ul style="list-style-type: none"> • Using Dynamic, Trained ML Models: Our system processes real-world datasets and learns from patterns to provide more accurate predictions. • Personalized Input Options: Users can provide specific details, improving prediction relevance. • Transparent Methodology: The model explains feature importance, helping users understand how prices are derived. • Scalability: It can grow with more users and larger datasets due to its cloud-based, componentized architecture. <p>Thus, the invention improves trust, reliability, and accessibility in used car valuation.</p>
<p>3. The technical features of your invention which are different from the existing inventions/applications:</p> <p>Unlike existing tools, AutoValuator is built entirely from scratch with:</p> <ul style="list-style-type: none"> • An integrated ML engine trained using multiple regression models and optimized to use Random Forest Regressor for best accuracy. • Interactive user interface (React.js) which allows real-time input, result viewing, and dynamic visualization of predictions. • Feature selection via ExtraTreesRegressor, which ensures only the most important variables are used. • Automatic depreciation forecasting, showing predicted prices over upcoming years using generated line graphs. • PDF generation capability of price reports along with visual trends, allowing users to save/share their estimates. • Modular and open design allows easy updates or integration into other platforms (e.g., OLX, Cars24, etc.) <p>This fusion of ML with a real-world application not only improves functionality but also democratizes access to smart vehicle valuation.</p>
<p>4. Main advantages of your invention: -</p> <ul style="list-style-type: none"> • Accurate, real-time price predictions • Easy-to-use web interface • Transparent feature-based pricing logic • Integration-ready and scalable system • Time and cost efficiency for both buyers and sellers • Custom PDF reports and depreciation insights • Open-source technology stack minimizes cost
<p>5. Complete description of the invention</p>
<p>a. Components/Embodiments involved in the invention</p> <p>Frontend Interface (React.js):</p> <ul style="list-style-type: none"> • Takes user inputs like car brand, year, mileage, etc. • Displays prediction result and graphs <p>Backend Server (Python + Flask):</p> <ul style="list-style-type: none"> • Receives data from frontend • Passes it through preprocessing and prediction pipeline • Returns predicted price and price range

Machine Learning Module (scikit-learn):

- Trained using a dataset of used car prices
- Applies techniques like:
 - Feature encoding (One-Hot)
 - Regression modeling (Random Forest)
 - Feature importance analysis

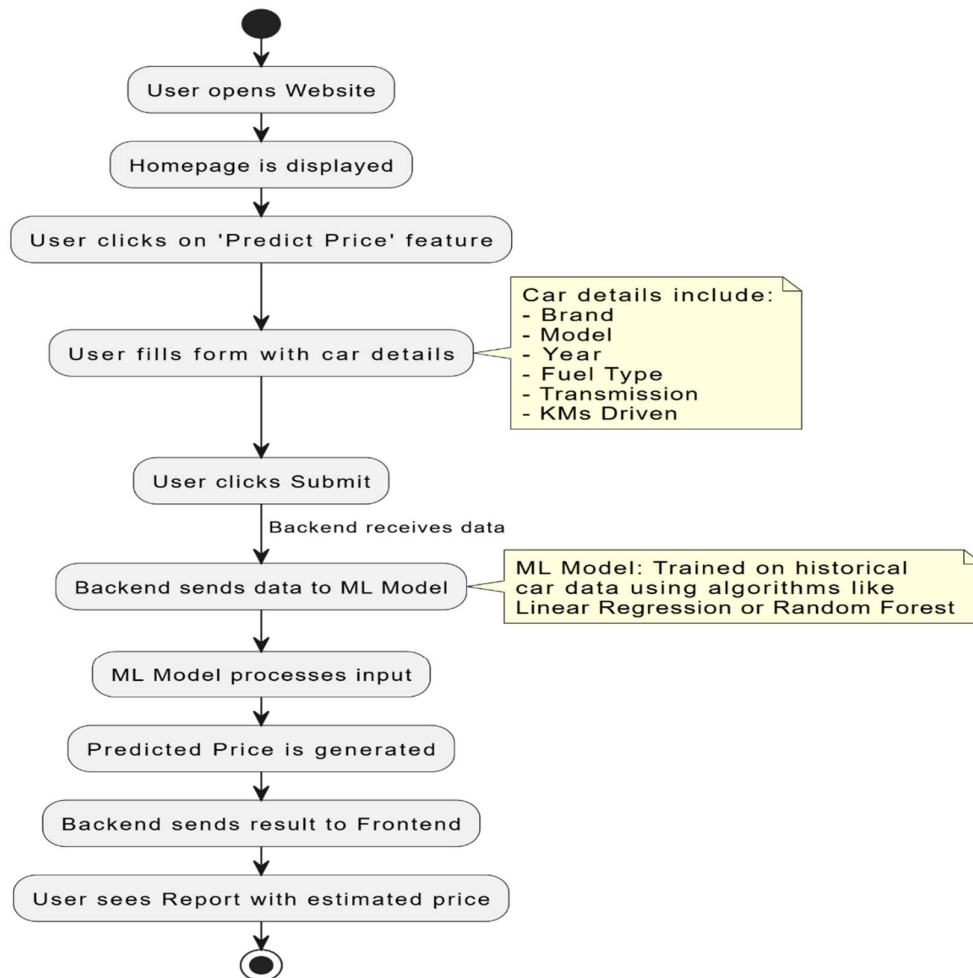
PDF Generator Module (ReportLab):

- Creates downloadable PDF reports
- Contains user inputs, price prediction, depreciation graph

b. How are the components installed/arranged?

- React frontend is deployed on Vercel (or similar)
- Flask backend runs on Heroku/localhost
- Trained ML model is loaded at runtime using joblib
- API connects frontend to backend
- User interacts via web browser
- Graph generation is handled using matplotlib

c. Figures/Structures:



1. List of novel features in the invention

- Use of ExtraTreesRegressor for smart feature selection before model training
- Real-time price depreciation forecasting with visual graphs
- PDF-based report generation including user inputs and visual insights
- Seamless integration of ML with a web app (React + Flask)
- Dynamic interface that updates results instantly with new input
- Prediction accuracy improvement via preprocessing strategies
- Modular approach that allows easy deployment and scaling

2. List of keywords relevant to the invention:

- Car Price Prediction
- Machine Learning
- Used Car Valuation
- Web-based Estimator
- Random Forest Regressor
- Python Flask
- React.js Frontend
- Auto Price Depreciation
- Smart Valuation
- Predictive Analytics

3. Any other relevant details:

- The model has been tested with multiple test cases and achieved over 90% accuracy in most real-world examples.
- The system is ready for commercial scaling and academic publishing.
- Research paper has been prepared and submitted successfully.