碳封存，是在温室效应的地球上对碳循环的合理利用。森林作为调节气候的重要生态角色，其碳封存能力不容小觑。为了更好地减轻碳排放的危害，我们使用了FCSME：森林碳封存评价模型来对森林进行管理策略的制定。

Carbon Sequestration is a reasonable recycle of Carbon on the Earth where greenhouse effect floods. Forests, as an essential part of ecosystem, are in whopping capacity of Carbon Sequestration.

为了更好地衡量“地球之肺”的碳封存能力，我们用设置好规则的森林自然演替元胞自动机模型来模拟自然条件下种群密度的变化，在Living Environment Index达到232时可以进入稳定阶段。同时，还使用了二元材积碳封存回归模型确定了森林未来一段时间的封存量，并用收获量进行了敏感度分析，得到在亚寒带林带以适当的（3%左右）的砍伐率可以得到最大的封存量：约256.83吨/公顷/年。不止这些，我们还做了7种木质产品的不同比重，通过RBF神经网络预测了在未来100年内的产品封存量，而这些在100年后仍能达到140吨左右。这不仅与实际相吻合，而且也提供了科学的森林管理策略。

In order to better measure the competence of Carbon Sequestration of “Earth’s Lung”, a Cellular Automata Model of natural forest succession is applied to simulate the change of population density under natural conditions, which can enter a stable stage when the Living Environment Index reaches 232. Meanwhile, we develop Binary Timber Volume Carbon Sequestration Regression Model to determine the Mass of Carbon sequestered during a period of time in the future. Sensitivity test of the Carbon Mass is carried out to find that the Subboreal coniferous forest would sequester 256.83 tons of Carbon Dioxide per hectare under an appropriate Harvest Rate of around 3%, which ranks the highest. Furthermore, we compare different proportions of 7 kinds of wooden products and predict the Mass of Carbon Sequestered in those products over 100 years via Radial Basis Function [Neural Network](http://dict.youdao.com/w/neural%20network/#keyfrom=E2Ctranslation), which will reach around 140 tons after 100 years. Our results not only coincide with reality, but also provide Forest Managers with scientific Forest Management Strategy.

森林的社会价值也是一个不可忽视的内容，我们将其分为了生态价值和文化价值。通过建立先进的多树种竞争下碳汇价值微分方程组，得到样地的种间竞争修正的强度热力图，其中最高的强度指标可达到0.012，体现了竞争与碳汇的生态能力。Furthermore，我们建立了文化价值的综合评价模型，以层次结构、枯木量、行政区占比、密度、占地面积构建，适用于全美9大区，4种主要林带类型，发现亚热带常绿阔叶林以0.993638（无harvest）和0.98369（harvest）的得分位居最高位。综合考虑carbon sink和cultural价值，我们用topsis和z-score标准化划分了指标区间，这样可以更好地确定过渡点，为决策者提供更好的公共服务战略。

In the meantime, social value of Forests is of great significance, which is divided into Ecological Value and Cultural Value. Through establishing improved Differential Equations of Carbon Sink Value under Multi-Tree Species Competition, we obtain Intensity Thermodynamic of Sample Area Interspecific Competition, in which the highest intensity index reaches 0.012, representing the Ecological Value of Competition and Carbon Sink.

What’s more, we develop a Comprehensive Evaluation Model of Cultural Value based on

Forest Hierarchy, Volume of Deadwood, Proportion of Forest over Administrative Region, Forest Density and Forest Area, which is applicable to 4 kinds of typical classes of Forests in 9 Regions of United States. By combining Ecological Value with Cultural Value, we figure out that Subtropical Evergreen Broad-leaved Forest ranks the highest with 0.993638 (no-harvest) and 0.98369 (harvest).

应用于实际的森林能够显示出决策模型的正确性和健壮性。首先使用中断时间序列模型预测竞争强度。其次，在选取了亚寒带地区的10000公顷的森林后，以douglas fir和pinus densiflora为主要树种的针叶林在有竞争的条件下100年后会封存约261.3吨/公顷/年的碳，这与实际符合度可达到91.9%。在轮伐期为13年，砍伐率0.29时，最大碳封存量仍可达到261吨/公顷/年。

Application on real Forests demonstrates the correctness and robustness of our Model. First of all, we apply Autoregressive Integrated Moving Average (ARIMA) model to predict the intensity of competition. After that, by selecting and calculating 10000 hectares of Subboreal Forests consisting of Douglars Fir and Pinus Densiflora as primary types of trees in Washington State, we find that the Forest will sequester 261.3 tons of Carbon Dioxide per hectare per year, whose gap from reality is merely 8.1\%.