

Documentation for Puzzle.cpp

```
public:
    // Constructors
    Puzzle();
    Puzzle(vector< vector<int> > src);
    Puzzle(istream& file);

    // Used to print out the width of the matrix
    int width() const ;

    // Used to print out the width of the matrix
    int height() const;

    // Checks if puzzle state is empty
    bool empty();

    // used to extract element at the given position
    int at(int i, int j) const;

    // Prints out the state
    void printState() const;

    // State clone;
    vector<vector<int> > stateClone();

    // Check completion of state;
    bool checkStateCompletion();

    // List valid moves individual pieces can make;
    vector<char> moveList(int piece);

    // Returns a list of all the moves from all the elements for a given state space
    void allMoveList();
    // Moves the given element in the selected direction
    void applyMove(int piece, char dir);

    // Normalizes the state
    void normalize();
    void swapIdx(int idx1,int idx2) ;
```

```
// Compares the object to another 2D vector
bool compare( vector< vector<int> > src )const;

// Compares two separate objects
bool compare(const Puzzle& p )const;

// Lists out all the elements in the state
vector<int> elementList();

// Overload compare operator for use with maps as key
bool operator<(const Puzzle& other) const;
```